CrossEU

D4.5 - Analysis of social aspects and consequences of climate change related policies

(Version 1)

WP4 - Task 4.3

May 2025

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Executive Summary

The "D4.5 - Analysis of social aspects and consequences of climate change related policies (Version 1)" is submitted in the framework of WP4 and reports on the work done in the framework of Task 4.3 (T4.3). It includes the first results of the work carried out in this task and will be complemented with the work to be implemented in the next months and will inform, globally, the Deliverable D4.6. The task T4.3 entailed so far, an analysis of social aspects and consequences of climate change related policies, with a specific focus on questions related to social justice, gender in an intersectional perspective (considering multiple forms of discrimination or inequality), social cohesion and social exclusion, and on how policies can increase the capacity of different groups to adapt to climate risks.

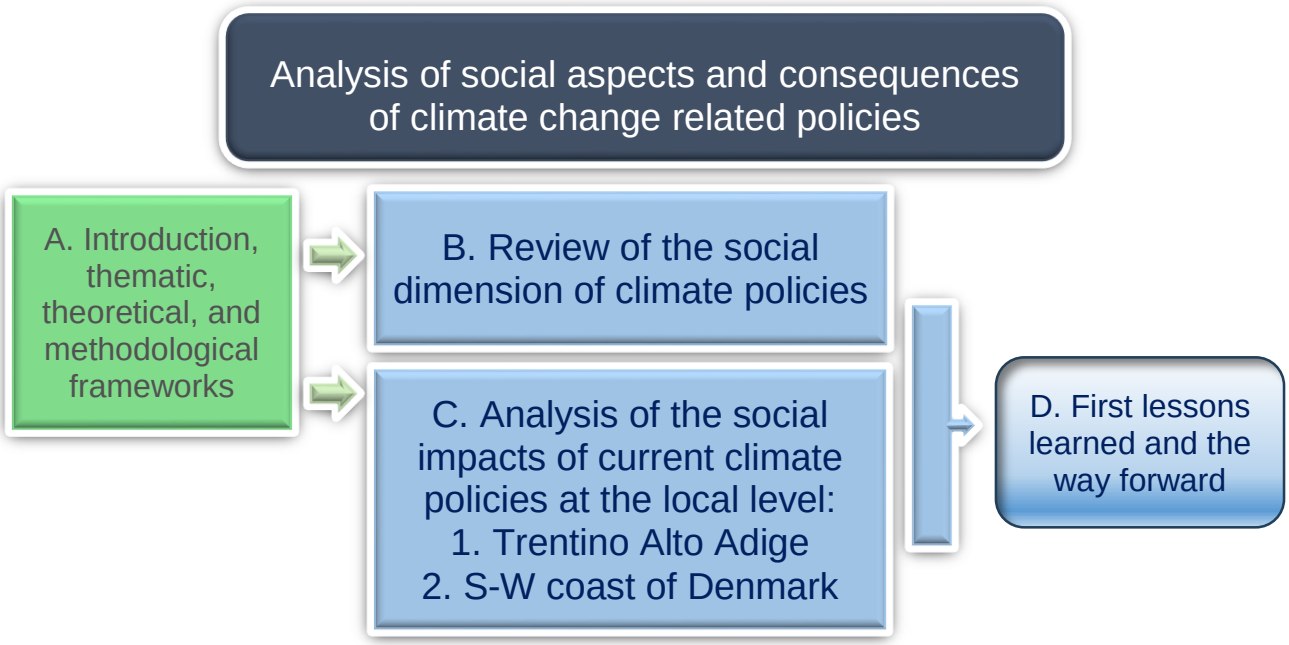
D4.5. is divided into four parts. The first part contains an Introduction – the first chapter – dedicated to the basic information about the CROSSEU project, the WP4, and T4.3. Then, it is followed by other three chapters (from 2 to 4), which present respectively the thematic, theoretical, and methodological frameworks of the analysis carried out so far.

The second part focuses on reviewing the social dimensions of climate policies. It is well established that climate change exacerbates inequalities, and this connection, to a certain degree, is also true in the opposite direction. Less widely recognised, however, is that disadvantaged groups can also become significant contributors to greenhouse gas emissions. This is mainly due to the unintended negative effects of certain mitigation and adaptation (M&A) policies, which can adversely impact vulnerable populations and exclude them from policy implementation. This section provides a detailed analysis of these dynamics, highlighting key shortcomings of some policies that may marginalise or penalise disadvantaged groups – sometimes prompting strong resistance. To address these challenges, the section explores ways to integrate climate action with social justice and examines the potential role of disadvantaged populations as active agents in the climate transition.

The third section presents findings from an initial analysis of the social impacts and related aspects of current climate policies at the local level, focusing on three hotspots within two CROSSEU case studies: the Trentino-Alto Adige Region (South Tyrol and Trentino) in Italy (CS4) and the southwestern coast of Denmark (CS3). This analysis was conducted through documentary review and interviews with key informants.

Finally, the fourth section will assess this experimental phase and outline the ongoing and upcoming activities of Task T4.3. These activities will inform Deliverable 4.6 by month 30 (M30).

A graphical summary of the deliverable is presented below.



Keywords

Vulnerability; Inequality; Unintended effects of climate policies; Mitigation; Adaptation; Disadvantaged people; Social effects

Abbreviations and acronyms

Acronym	Description
ACCTING	AdvanCing behavioural Change Through an INclusive Green deal
APFM	Associated Program on Flood Management
CBD	Conference on Biological Diversity
CBDRM	Community Based Disaster Risk Management
CC	Climate Change
CCA	Climate Change Adaptation
CCHs	Climate Change Hotspots
CCS	Carbon Capture and Storage
CoP	Conference of Parties
CRA	Climate Risk Assessment
CROSSEU	Cross-sectoral Framework for Socio-Economic Resilience to Climate Change and Extreme Events in Europe
CS	Case-Study
CREWS	Climate Risk and Early Warning System
DKK	Danish crowns
DRM	Disaster Risk Management
DSS	Decision Support System
EC	European Commission
ECB	European Central Bank
EEA	European Environment Agency
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EGD	European Green Deal
ETC/CCF	European Topic Centre on Climate Change impacts, vulnerability and Adaptation
EU	European Union
EWS	Early Warning System
FFGS	Flash Floods Guidance System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GNDR	Global Network of Civil Society Organisations for Disaster Reduction
ICT	Information and Communication Technology
IFRC	International Federation of Red Cross and Red Crescent Societies
ILO	International Labour Organisation
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for the Conservation of Nature
JTF	Just Transition Fund
LDCs	Least Developed Countries
LDN	Land Degradation Neutrality
LTS	Long-Term Strategy
LULUCF	Land use, land-use change, and forestry
M&A	Mitigation & Adaptation

Acronym	Description
NAPs	National Adaptation Plans
NbS	Nature-based Solution
NGOs/CSOs	Non-Governmental Organizations/Civil Society Organisations
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
PWP	Plant With Purpose
REDD+	Reducing emissions from deforestation and forest degradation in developing countries
SIDS	Small Island Developing States
SMEs	Small and Medium Enterprises
STL	Storylines
SDGs	Sustainable Development goals
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCCD	United Nations Convention to Combat Desertification
UNCOP	United Nations Conference of Parties
UNDESA	United Nations Department for Economic and Social Affairs
UNDP	United Nations Development Program
UNDRR	United Nations Disaster Risk Reduction
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention on Climate Change
UNESCO	United Nations Education, Science and Culture Organisation
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organisation
WMO	World Meteorological Organisation
VFDM	Volta Flood and Drought Management project
WP	Work Package

PART ONE – INTRODUCTORY FRAMEWORKS

1. Institutional framework

The objective of the CROSSEU project is to equip stakeholders with the necessary tools and insights to assess risks arising from climate hazards and make well-informed decisions in order to adapt to those risks and reduce their impact on different socio-economic sectors. Deliverable D1.1, on the CROSSEU methodology developed the requirements and expertise from multiple sectors converging to present the socio-economic risks of climate change, giving an overview of the co-design and development process as illustrated in Figure 1.

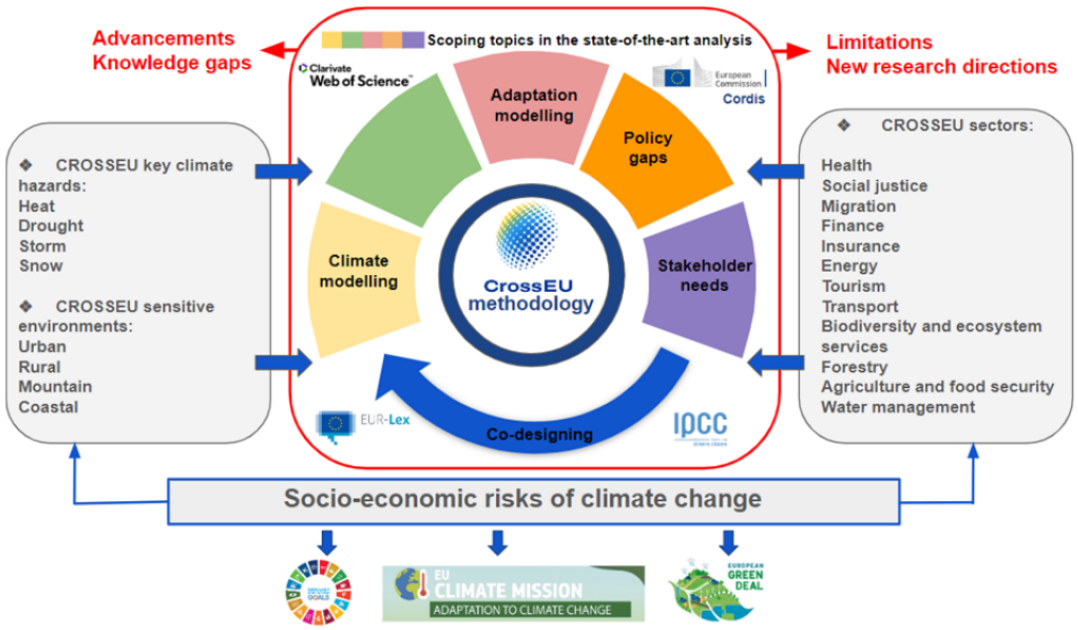


Figure 1 – Scoping analysis for the co-design and development of the CROSSEU methodology

Within CROSSEU, researchers need to collaborate and share data, knowledge and expertise. In this framework, Work Package 4 is intended to facilitate climate policy responses, including M&A, and to enhance the integration of climate change risks in decision-making and investments both in public and private sectors. WP4 includes five tasks aimed, respectively, at:

(i) Conducting a systematic and comprehensive analysis of the mitigation and adaptation measures in EU and national policy framework (T4.1)
(ii) Analysing climate change impacts and sectoral policy responses relevant for the STLs and CCHs addressed in regional and local in-depth case studies (T4.2)
(iii) Analysing social aspects and consequences of M&A measures in relevant EU, national and sectoral policies (T4.3)
(iv) Analysing climate change related economic and finance policies to mitigate the analysed risk storylines (T4.4), and
(v) Deriving knowledge-based recommendations for ambitious climate policy response in support of M&A (T4.5).

The present Deliverable D4.5 is the first one submitted with reference to T4.3 “Analysing social aspects and consequences of climate change related policies”.

It includes the first results of the work carried out in this task and will be complemented with the work to be implemented in the next months which will be contained in the Deliverable D4.6 (planned for M30).

T4.3 already entailed a systematic review related to the socio-economic effects and other aspects related to climate change policies (Mitigation and Adaptation M&A) with a specific focus on issues such as the inclusion and exclusion of disadvantaged people and the related concepts of equity (considering multiple forms of discrimination or inequality), just transition/social justice. The analysis on the social effects and other related social aspects of the ongoing climate policies at the local level has been already implemented in three hotspots. Learning from this experimentation, the analysis is presently going on in further eight hotspots and its results will inform D4.6.

T4.3 was implemented considering also some first T1.3 (Data collection and modelling of socio-economic impacts of climate change) findings where poverty and inequality in relation to climate change are also addressed.

Globally, T4.3 should inform (together with the T4.1, T4.2 and T4.4) the task T4.5 "Knowledge-based endorsement for mitigation and adaptation policy options", and more specifically, should make sure that the recommendations for ambitious and effective climate policy response that will be proposed by this task will be socially well-balanced. As we will see throughout this deliverable, there is too often a risk that some social aspects of climate change policies are underestimated, and therefore risk having unintended effects that can affect disadvantaged people with consequences that can undermine their very effectiveness.

This deliverable is organised in three parts.

In the first, after this brief institutional introduction, the problematic and historical context in which the issue of the social aspects of the climate policies is drawn, followed by the theoretical framework (main concepts and theoretical approaches) and the methodological framework adopted (how the work has been carried out including type of documents reviewed, the sources used and the documentation search procedures).

This first section is followed by the second one, which includes the main results of the global review with specific focus on the following issues:

- Climate change and inequality (and vulnerability)
- The unintended effects of climate policies on inequality (and vulnerability)
- Harmonise social justice and climate justice – the just transition perspective
- Disadvantaged people as agents of the climate transition.

The third section reports the findings of the initial analysis on the social effects and other related social aspects of the ongoing climate policies at the local level in three hotspots.

Finally, the fourth section describes the on-going and future work under implementation in T4.3. for informing by the M30 the deliverable 4.6.

2. Thematic framework

As for the other tasks of the WP4, the overarching framework of this first deliverable of T4.3 comes from a vision of climate change mitigation operationalised in a 2nd-degree target conceived by the Paris Agreement approved at the UNCOP in 2015 (which legally required countries to reduce their carbon emissions in order to limit global warming to 1.5°C compared to pre-industrial levels) and by the European Green Deal launched in 2019.

This framework, as described in more detail in D4.1, builds on previous major events, beginning with the UN Scientific Conference in Stockholm in 1972, also known as the First Earth Summit, and continuing with the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988, and the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, which established the link between science, sustainable development, energy production and consumption, transport, industrial development, stratospheric ozone depletion and transboundary air pollution. This Conference entailed the signature of the United Nations Framework Convention on Climate Change (UNFCCC). UNFCCC entered into force on 21st March 1994, and has been ratified by 197 countries.

UNFCCC started a UN process for negotiating an agreement to limit dangerous climate change. The cornerstone of the climate change action was the adoption of the "Kyoto Protocol" to the UNFCCC in Japan in December 1997. The document aimed to reduce the industrialised countries' overall greenhouse gas (GHG) emissions by at least 5% compared to the 1990 levels in the commitment period of 2008 to 2012.

All these UN agreements concern the broad issue of climate change mitigation, which has mainly meant reducing the emissions of greenhouse gases. In 2009 and 2010, adaptation began to receive more attention during international climate negotiations, having made clear that achieving international consensus for emission reductions would be more challenging than had been hoped. In 2009, the rich nations of the world committed to providing a total of $100 billion per year to help developing nations fund their climate adaptation projects. This commitment was underscored at the 2010 Cancún Summit, and again at the 2015 Paris Conference. The promise was not fulfilled, but the amount of funding provided by the rich nations for adaptations did increase over the 2010 – 2020 period[1].

Nowadays, the protection of the environment through both mitigation and adaptation policies is a high priority for many governments. However, despite increased awareness and intensive discussions, the environmental policy implemented by governments tends to be less ambitious than their promised policy and far from sufficient to reach their long-term climate targets. According to the recent UNEP Report, with the currently implemented policies, half of the

[1] Jocelyn Timperley (2021). "The broken $100-billion promise of climate finance — and how to fix it". Nature. 598 (7881): 400–402.

G20 countries, including the United States, are unlikely to meet their original commitments under the 2015 Paris Agreement[2].

Adaptation policies are those that aim to adapt people and communities to climate change by adapting everyday life to increased temperatures and to the related consequences. These consequences are, on the one hand, slow but very significant even in the short and medium term, processes such as the increase in global air temperature, the melting of ice caps/bergs, and the rise in the sea level, as well as major droughts; on the other hand, changes in the dynamics of catastrophic extreme events such as tropical storms, floods, avalanches, landslides, heat waves, etc. Events that have always occurred in the past, but which seem to occur with a greater frequency and intensity in connection to climate change (e.g., increase of the temperatures).

There are basically two ways in which people "adapt": a) by seeking to make sure that such events occur as little as possible and are as little intense as possible (e.g., however this depends also from mitigation policies; see later); b) by seeking to make sure that human communities are able to withstand such events as best they can (i.e., increasing their resilience). So, consulting the European Climate Adaptation Platform "Climate-ADAPT", possible adaptation measures are (the list is far from being exhaustive)[3]:

- Erecting buildings and infrastructure that are safer and only in areas that are not prone (or at least less prone) to extreme events
- Building green roofs to reduce urban heat island effects
- Developing and disseminating Early-Warning Systems
- Replanting forests (and countering deforestation)
- Restoring damaged ecosystems also thanks to the adoption of nature-based solutions
- Developing blue-green infrastructures for strengthening coastal defence
- Building seawalls to protect against sea level rise
- River Basin Management Plans/Flood Risk Management Plans
- Planting drought-resistant crops
- Developing Community-Based Risk Management schemes tailored to each specific territorial context and in close cooperation with the involved communities
- More generally, all the awareness-raising and training/capacity-building activities aimed at increasing the level of preparedness of communities prone to risk (actually and eventually).

Mitigation policies and measures focus on addressing the root cause of climate change by reducing greenhouse gas emissions and enhancing carbon sinks. These policies cover various sectors, including energy, transport, buildings,

[2] Olhoff, A., & Christensen, J. M. (Eds.) (2020). Emissions Gap Report 2020. UNEP DTU Partnership. Available at: https://www.unep.org/emissions-gap-report-2020.
[3] See the European Climate Adaptation Platform Climate-ADAPT https://climate-adapt.eea.europa.eu/en/eu-adaptation-policy/sector-policies

industry, agriculture, and waste management. Possible mitigation measures, highlighted by IPCC, are (the list is far from being exhaustive)[4]:

- Improving energy efficiency and opting for renewable energy in enterprises and in buildings (also in relation to the introduction of new codes and standards compatible with 0 emissions or very low emissions)
- Introduction of energy management systems (also voluntary) in the enterprises
- Brokerage for industrial cooperation
- Introduce new taxes, such as carbon tax, fuel tax and other fossil energy taxes, fertilizer or nitrogen taxes, sprawl tax
- Introduce subsides, such as fossil fuel subsidy removal, biofuel subsidies, subsidies or tax exemptions for investment in efficient buildings, retrofits and products, subsidies for energy audits for enterprises and buildings, credit lines for low-carbon agriculture
- Enforcement of fuel and vehicle standards compatible with 0 emissions or very low emissions
- Emission credits
- Regulatory restrictions to encourage modal shifts (road to rail)
- Restriction on use of vehicles in certain areas/urban planning and zoning restrictions
- Provision of utility infrastructure, such as electricity distribution, district heating/cooling and wastewater connections, etc.
- Reforestation and reduction of deforestation (also in relation to improved laws/regulatory frameworks)
- Investment in improvement and diffusion of innovative technologies in agriculture and forestry
- Information policies to support REDD+ (Reducing emissions from deforestation and forest degradation in developing countries), including monitoring, reporting and verification
- Labelling programmes for efficient buildings
- Promotion of sustainability by developing standards and educational campaign
- Energy advice programmes.

There are climate policies that are both functional to mitigation and adaptation. The most emblematic case (but not unique, as we will see in Section 2, is reforestation and the reduction of deforestation since this contributes, on the one hand, to a greater sequestration, and therefore reduction, of emissions, and to a greater stability of the land, reducing risks such as floods, avalanches and landslides. On the other hand, the construction of green roofs, which reduce both the urban heat island effect (adaptation) and emissions (mitigation). There are also measures functional to adapting to climate change that have harmful effects in terms of mitigation (e.g., more air conditioning, which requires an abnormal consumption of energy, often also coming from fossil fuels).

[4] IPCC (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. Available at: https://ndma.gov.in/sites/default/files/PDF/Technical%20Documents/NDMA-Module-3.pdf

3. Theoretical framework

3.1. Objectives and scope

The explicit objective of the Task 4.3 is to entails the analysis of the social aspects of the climate policies for their distributional patterns and their suggested effects on balancing out potential negative societal impacts or any re-enforcing or hampering responses in climate protection.

Related to this objective, the idea has been to analyse and highlight so far:

1. The interrelationships between climate change as a cause and effect of inequality (vulnerability);
2. The unintended effects of climate policies (adaptation and mitigation) on inequality (and vulnerability) and, consequently, on climate change itself
3. The need, therefore, for climate policies geared toward equity and social inclusion (Harmonising Social Justice and Climate Justice in a Just Transition Perspective)
4. The central role that disadvantaged people can and must play as true agents of climate transition in this framework

To do that, the focus is on questions related to social justice, gender in an intersectional perspective (considering multiple forms of discrimination or inequality and inequity), social cohesion and social exclusion, and on how policies can increase the capacity of different groups to adapt to climate risks. Emphasis is also on the relations between just energy/climate transitions and potential negative effects on particularly vulnerable groups and any increase in social inequalities.

3.2. Framework concepts

Here below a brief presentation of the main concepts in this text.

Climate policies can be divided into mitigation and adaptation policies[5] (with some overlap), as shown in the Figure 2 below. Details on what are mitigation and adaptation policies with examples, and their overlaps have been already presented in the “thematic framework”.

[5] Khan A. (2021). Climate Change Adaptation & Mitigation: Vulnerability and Health. Global Health Equity website. Available at: https://ghe.uwo.ca/blog/posts/climate_change_adaptation_mitigation_vulnerability_health.html

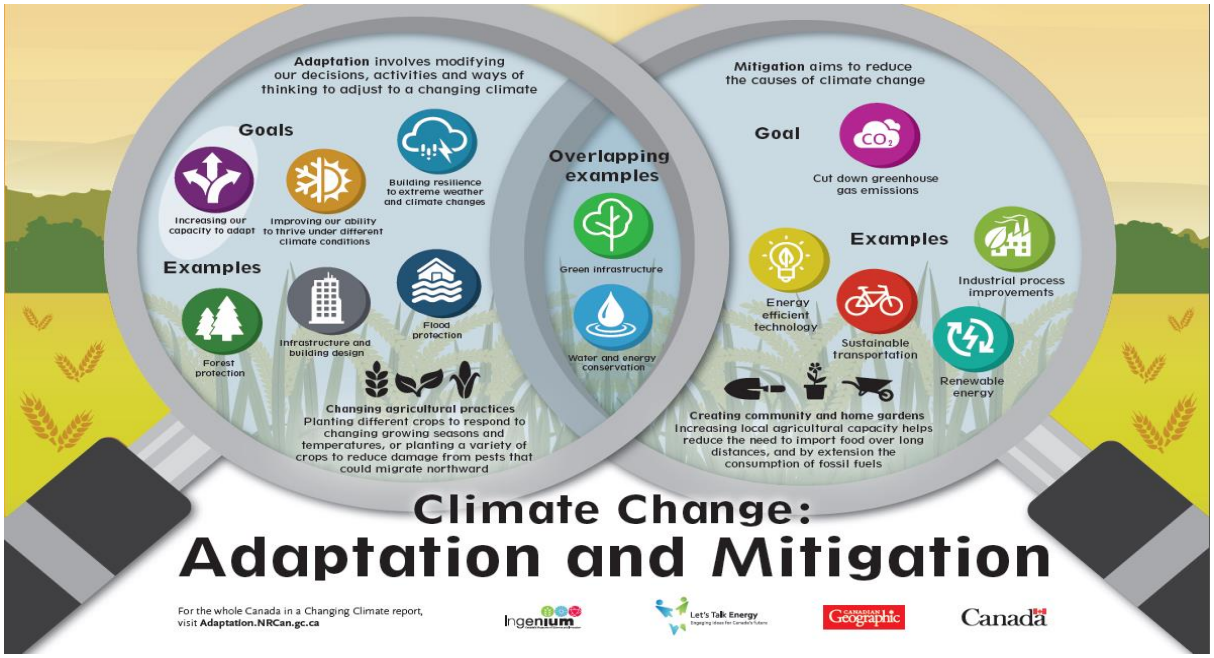


Figure 2 – Climate change: adaptation and mitigation

Source: https://ghe.uwo.ca/blog/posts/climate_change_adaptation_mitigation_vulnerability_health.html

Equity means "fair treatment, according to their respective needs. This may include equal treatment, or treatment that is different but considered equivalent in terms of rights, benefits, obligations and opportunities"[6].

Gender refers to the socially constructed roles, behaviours, activities and attributes that a given society consider appropriate for men and women, defining them as femininity and masculinity. It varies in time and place and between cultures. Gender is a social construct, distinct from biological sex, encompassing roles, behaviours, expressions, and identities that vary across cultures and time[7]. These expressions can change over time and can vary across cultures.

Gender sensitivity is the process by which people are made aware of how gender plays a role in life through their treatment of others. It highlights the importance of recognising both privilege and discrimination based on gender, emphasising that gender relations are present in all institutions. Gender sensitivity especially manifests in recognising privilege and discrimination around gender; women are generally seen as disadvantaged in society[8].

Inequality "is a complex and multifaceted phenomenon that spans a wide range of life dimensions (monetary and non-monetary) and methodological perspectives (…). We draw on five different methodological approaches to study inequalities across 10 key dimensions of human well-being (…): knowledge and skills, health, material living conditions, natural and environmental conditions,

[6] UN Women Training Centre eLearning Campus (n.d.-b). Gender equality glossary. UN Women website. Available at: https://trainingcentre.unwomen.org/mod/glossary/view.php?id=36&mode=letter&hook=G&sortkey=&sortorder=asc
[7] https://www.who.int/health-topics/gender#tab=tab_1
[8] Ck Sabitha (2020). Gender sensitivity. Available at: https://www.slideshare.net/slideshow/gender-sensitivity-230281164/230281164

working life, cultural life and recreation, political participation and voice, social and family life, bodily integrity and safety and overall life experience"[9]. Inequality can be taken as a critical lens through which to examine any social and economic policy, because policies are applied to and have effects on different groups of people that are, or can be, very different precisely because of the inequalities we have just discussed. Indeed, this, of course, also applies to climate change policies, if only because climate change poses a greater threat to exposed and vulnerable countries, communities and social groups

The theoretical discussion of this concept is very extensive and, therefore, we will revert to it in depth in the next section of this deliverable (also in relation to equity and inclusion, these three concepts being related, as shown in Figure 3 below), also relating it to a number of further concepts listed in this paragraph such as climate policies, just transition, gender, and others.

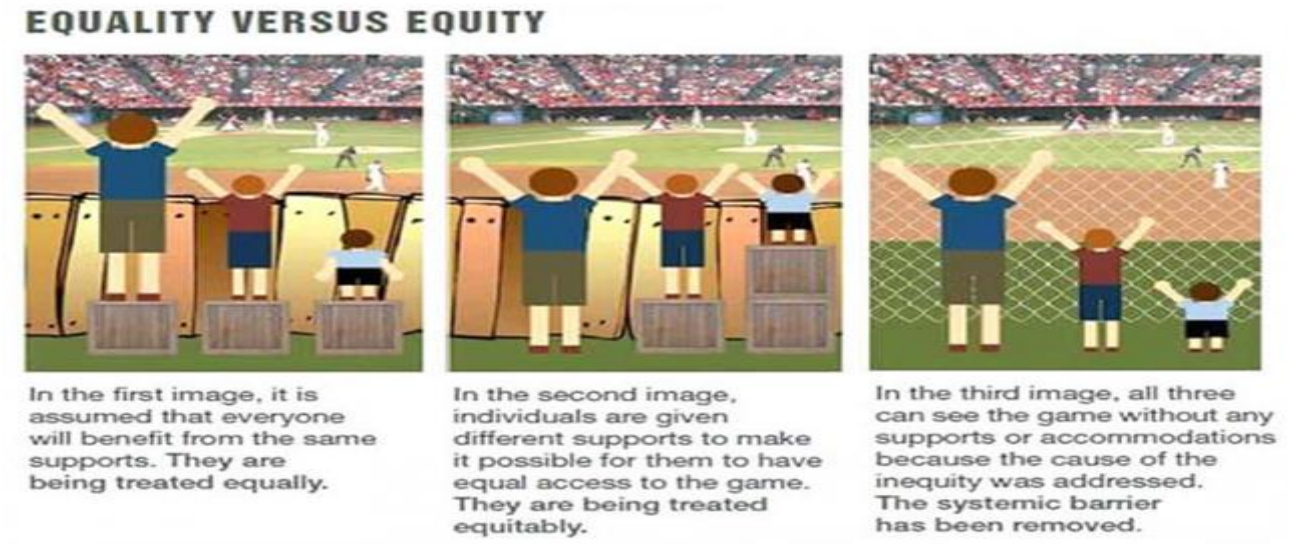


Figure 3 – (In)Equality – Equity – Inclusion

Source: https://www.diffen.com/difference/Equality-vs-Equity

Intersectionality is understood as "the complex, cumulative way in which the effects of multiple forms of discrimination (such as racism, sexism, and classism) combine, overlap, or intersect especially in the experiences of marginalised individuals or groups"[10]. So, "Intersectionality promotes an understanding of human beings as shaped by the interaction of different social locations (e.g., 'race'/ethnicity, indigeneity, gender, class, sexuality, geography, age, disability/ability, migration status, religion – see figure 4 below). These interactions occur within a context of connected systems and structures of power (e.g., laws, policies, state governments and other political and economic unions, religious institutions, media)"[11]. Thanks to the notion of intersectionality, beside those having one dimension (as those listed before), multiple intersectional vulnerability profiles can be identified: "young gay migrant in a

[9] European Commission (2021). EU Multidimensional Inequality Monitoring Framework. EU website. Available at: https://knowledge4policy.ec.europa.eu/projects-activities/multidimensional-inequality-monitoring-framework_en
[10] https://http://www.merriam-webster.com/dictionary/intersectionality
[11] Hankivsky, O., Grace, D., Hunting, G., Giesbrecht, M., Fridkin, A., Rudrum, S., ... & Clark, N. (2014). An intersectionality-based policy analysis framework: critical reflections on a methodology for advancing equity. International journal for equity in health, 13, 1-16.

lower social class"; "illiterate elderly woman"; "homeless elderly disabled person"; "young non-white working class woman, in a society marked by racism and sexism". Of course, dozens more could be outlined.

Figure 4 – An intersectionality picture

Source: https://iwda.org.au/what-does-intersectional-feminism-actually-mean/

Just transition means "Greening the economy in a way that is as fair and inclusive as possible to everyone concerned, creating decent work opportunities and leaving no one behind"[12] (see figure 5 below). The theoretical discussion of this concept is contextualised with energy and climate (just energy transition; just climate transition) and is also linked to the ones of social justice in relation to climate justice. So, it is very extensive and, therefore, we will revert to it in depth in the next section of this deliverable.

Figure 5 – What does 'just transition' really mean? –

Source: https://www.canarymedia.com/articles/guides-and-how-tos/what-does-just-transition-really-mean

[12] UNDP (2022). What is just transition? And why is it important? Available at: https://climatepromise.undp.org/news-and-stories/what-just-transition-and-why-it-important

'Policy' refers to a set of actions (as well as non-actions) taken by public and private actors that are in some way related to a collective problem[13].

Social cohesion refers to the extent to which people in a society are bound together and integrated, sharing common values and a sense of belonging, fostering positive social relations and a focus on the common good.

Social inclusion is defined as the process of improving the terms of participation in society, particularly for people who are disadvantaged, through enhancing opportunities, access to resources, voice and respect for rights[14]. Social inclusion is a multidimensional concept taking into account issues such as the employment, the access of social services, health and education, the non-discrimination (political, ethnic, religious, etc.) or the mobility[15].

Vulnerability refers to "the quality or state of being exposed to the possibility of being attacked or harmed, either physically or emotionally", while Social vulnerability refers to the inability of people, organisations, and societies to withstand adverse impacts from multiple stressors to which they are exposed"[16]. Marital status, employment, and income have an impact on the level of vulnerability presented in individuals[17], as well as many other people' features, such as gender identity, ethnicity, geographical isolation, disability, age, and religion belief. In the ACCTING project[18], vulnerability profiles are identified according to the following criteria: Gender, Gender Identity, Age (e.g., the elderly people on one hand, and children on the other), Disability, National minority, Ethnicity, Religion/belief, Sexual orientation, Socioeconomic background (employment, income, etc.), and Geographical isolation. A few people are characterised by only one of the conditions (or traits) just listed, but many others are characterised by more than one. It is therefore important to link it to the notion of intersectionality already presented above.

4. Methodological framework

As specified in the Grant Agreement, task 4.3. should be based on a scientific literature review, analyses of policy documents as well as stakeholder interviews in case studies (around 30-40 interviews in the CROSSEU partners' countries).

The sources consulted so far are presented briefly below.

Literature review: analysis of around 150 studies about the concepts introduced in the theoretical framework (e.g., inequality/in-equity, social inclusion; gender/vulnerability/intersectionality; social and climate justice/social

[13] Dente B. (1990). Le politiche pubbliche in Italia ed. Il Mulino.
[14] https://sumas.ch/sustainability-101-why-is-social-inclusion-important/#:~:text=According%20to%20the%20United%20Nations%20%E2%80%9CSocial%20inclusion%20is,access%20to%20resources%2C%20voice%20and%20respect%20for%20rights.%E2%80%9D
[15] Mastropietro E. (2001). Rapid appraisal method of social exclusion and poverty (RAMSEP project): Handbook. Roma.
[16] Luis Flores Ballesteros. "What determines a disaster?" 54 Pesos May. 2008:54 Pesos 11 Sep 2008. Available at: http://54pesos.org/2008/09/11/what-determines-a-disaster/
[17] Turner, H. A., & Turner, R. J. (1999). Gender, social status, and emotional reliance. Journal of health and social behavior, 360-373. DOI: 10.2307/2676331.
[18] Zorell, C., & Strid, S. (eds.) (2023). D3.2 ACCTING Report on first cycle experimental studies. Confidential report delivered to the European Commission 28 April 2023. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I. https://accting.eu/

cohesion/just transition) with specific reference to climate change issues; and on how climate policies involve and affect disadvantaged/vulnerable people.

Policy analysis: analysis key reports from international organisations and programmes dealing with these issues, as well as key documents produced at the local level in three hotspots (in two CRISSEU case-studies). Globally, around 50 reports have been consulted.

Stakeholder interviews: overall ten key-informants were interviewed in these same hotspots.

In the following paragraphs, we specify how these actions have been operationalised so far (we would like to point out that this deliverable is only a first step in the implementation of the task).

4.1. Global review

Having briefly recalled in the thematic framework the main adaptation and/or mitigation policies, the review entailed, firstly, an in-depth analysis of the concepts introduced in the theoretical framework (inequality/in-equity, inclusion; gender/vulnerability/intersectionality; social and climate justice/social cohesion/just transition) with specific reference to climate change issues.

Secondly, it looked for relevant evidence and, in particular, concrete examples of how such policies involve and affect disadvantaged people or those characterised by a vulnerability profile. Impacts that result in situations of inequality/exclusion, through an analysis of several reports from international organisations (e.g., EC, EEA, IFRC, ILO, IUCN, IMF, UN, UNDESA, UNDP, UNEP, UNESCO, UNICEF, WMO, World Bank) and programmes (e.g., CREWS, FFGS, IPCC, PWP, VFDM, WeADAPT) dealing with climate change adaptation and mitigation, as well as some recent studies addressing these issues. Globally, almost 200 sources were identified and consulted using a 'snowball' approach, starting with the IPCC, the WeADAPT platform and the main reports of international climate policy bodies. Keywords specific to the different climate policies under consideration were also identified, as well as studies that have addressed them.

It should be emphasised that the scope of the very heterogeneous sources used is varied and different: in some cases (the WeADAPT platform and the EC and EEA reports) it is Europe (or some of its countries or regions); in others (e.g., most of the reports of the UN bodies) it is the 'Global South' or part of it; still others (e.g., IPCC) have a worldwide scope; etc. This should not be a problem, as all the climate policies considered are universal in one way or another.

4.2. Interviews and documentary analysis in the case-studies

At the present stage, interviews were implemented (experimentally) in three first hotspots, one related to the CROSSEU CS3 (Storm damages in Southwestern Denmark and Northern Germany) and two to the CROSSEU CS4 (Valuation of social benefits of floods and flash floods adaptation and mitigation in Northeastern Italy). The CS3 hotspot is the Southwestern coast of Denmark;

the CS4 hotspots are the Provinces of Trento (Trentino) and Bozen (South Tyrol) in Italy.

This activity was implemented in conjunction with T4.2 (analysing climate change impacts and sectoral policy responses relevant for the STLs and CCHs addressed in regional and local in-depth case studies), as the key-informants to be interviewed were the same: policy-makers implemented in the design and implementation of climate policies; NGOs/environmental movements/CSOs representatives engaged in the design and implementation of climate policies; scientific community dealing with these issues.

Globally, ten key-informants were interviewed online in March/April 2025 by BOKU and DTU (CS3) and K&I (CS4):

- 5 in CS3 (two representatives of municipalities hidden by coastal floods; two representatives of NGOs (a Foundation and a Think Tank; and one representative of the University of Southern Denmark)
- 5 in CS4 (one representative of the technical offices of the Trentino's provincial government; one representative of the technical offices of the South Tirol's provincial government; one responsible of the civil protection; one responsible of one of the main first responder NGOs; one responsible of the local coordination of environmentalists NGOs).

Interviews were qualitative with the support of an interview guide dealing with all the issues related to T4.2 and T4.3 and lasted 45-70 minutes. They were implemented remotely. Each interviewee is identified through a code (see Annex).

Interviews were coupled with a documentary analysis of the climate policies in the two hotspots (e.g., South Tyrol Klimatplan 2040[19]; Trentino Climate 2021-2023[20] and "The State of the Climate in Trentino. The Impacts of Climate Change on Environmental Systems and Socioeconomic Sectors"[21]) and benefitted of the findings of a 2000 people survey implemented in CS4 (in the frame of WP2). Both these interviews and survey have, at the specific input of K&I, also considered (among many other issues) the topics pertinent to T4.3.

4.3. On-going and future activities

A brief assessment of this experimentation is presented in the fourth section of this deliverable where the on-going and future activities of the Task T4.3 will be also described. As mentioned above, the T4.3 analysis is focused on the social aspects of climate policies and in particular their distributional patterns and the effects on balancing out potential negative societal impacts or any re-enforcing or hampering responses in climate protection with a specific focus on the issues identified above (social justice, inequality and inequity, social cohesion and social exclusion, and on how policies can increase the capacity of different groups to adapt to climate risks, etc.).

[19] https://www.klimaland.bz/wp-content/uploads/Klimaplan-Suedtirol-2040_ITA_WEB-pagine-singole.pdf
[20] https://www.ufficiostampa.provincia.tn.it/content/download/227624/3654885/file/schede_Strategia_clima2023.pdf
[21] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino

This analysis will be carried out in further 8 hotspots distributed along the CROSSEU case studies, in cooperation with the relevant case-study leaders and partners, so complementing T2.2 (Detection and assessment of sectoral and cross-sectoral CCHs) where impacts of climate change are extensively assessed for the identified CCHs (e.g., on social justice, on social cohesion/inclusion, on vulnerability issues and equity aspects).

T4.3 will be concentrated, as already stated, on the effects of climate policies through an analysis of policy documents and further 30 interviews with key informants at the case-study level (globally 40 interviews, including the ones already implemented in the three hotspots considered in this deliverable). The findings of this analysis will be included in the deliverable D4.6.

All the findings of T4.3 will inform T4.5 aimed at deriving knowledge-based recommendations for ambitious climate policy response in support of M&A that will be included in D4.9.

PART TWO – CLIMATE CHANGE POLICIES, SOCIAL JUSTICE AND VULNERABILITY: Literature and Document Review

Funded by the European Union

The second section of this deliverable includes the main results of the global review implemented until April 2025. The results of the review were structured according to the following four major themes (already introduced in §3.1):

- Interrelated effects between climate change and inequality (and vulnerability)
- The unintended effects of climate policies (adaptation and mitigation) on inequality (and vulnerability)
- Climate policies towards equity and social inclusion - harmonise social justice and climate justice in a just transition perspective
- Disadvantaged people as agents of the climate transition.

In carrying out this review, extensive use is made of all the concepts presented in the theoretical framework (e.g., inequality/in-equity, social inclusion; gender/vulnerability/intersectionality; social and climate justice/social cohesion/just transition), through some specific insights and by relating them to each other.

Special focus is given to gender, issue transversal to all the four themes (e.g., looking at gender inequality in the impacts of climate extreme events; at the unintended effects of climate policies on gender; and, conversely, also at their positive effects; and how women are agents of climate transition): indeed, gender issues are cross-cutting with all the four themes of this section.

A tentative graphical illustration showing the climate change process and its interrelated effects with existing inequalities, the influence of the negative unintended effects of climate policies, and the possible role of disadvantaged people towards an actual just transition is presented below. All of this is within the theoretical framework of the concepts already presented.

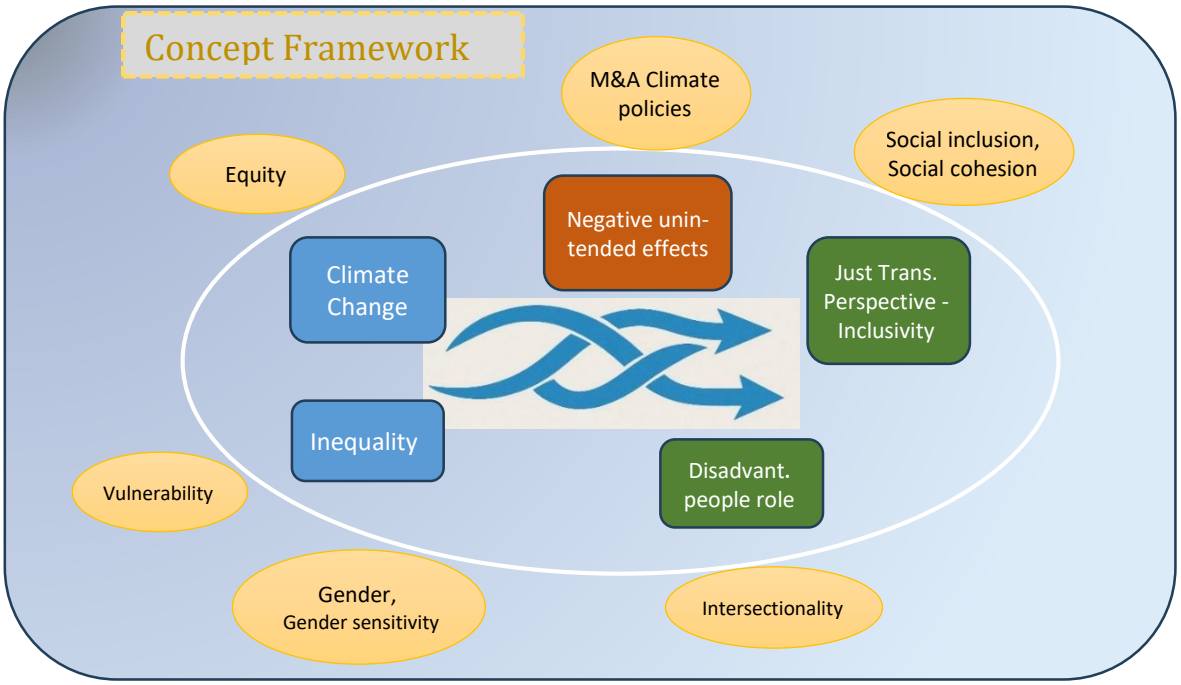


Figure 6 – Theoretical framework applied to the global review

Source: Knowledge & Innovation

1. Climate change and inequality

1.1. What can we understand by the term inequality?

As stated in the Theoretical framework, the discussion of the notion of inequality is very extensive and, therefore, before going into the analysis of its conceivable relationships with climate change, we must revert to it in depth.

Indeed, behind the word inequality lie hundreds of definitions and notions in domains ranging from mathematics to physical features of people, from art to business management, from finance to calligraphy.

Firstly, we can recall the definition proposed by the European Commission, according to a multidisciplinary approach:

> *"Inequality is a complex and multifaceted phenomenon that spans a wide range of life dimensions (monetary and non-monetary) and methodological perspectives (...) We draw on five different methodological approaches to study inequalities across 10 key dimensions of human well-being (...): knowledge and skills, health, material living conditions, natural and environmental conditions, working life, cultural life and recreation, political participation and voice, social and family life, bodily integrity and safety and overall life experience."*[22]

There is a large debate on what inequality means. Even "narrowing" the focus to the social sciences (sociology, economics, demography, etc.) there is no agreement on what is the phenomenon we are talking about.

> *"The issues of inequality and differentiation are fundamental, since they form the first stage of constructing sociological thinking and establish the base reference for complex theoretical elaborations. It may be supposed that they are simple topics, with a consolidated literature, stable theoretical reflection and consistent empirical verification. There is none of this, however. The issues remain controversial, and a good part of the elementary questions and fundamental debates remain inconclusive."*[23]

Inequalities can relate to income[24], employment status, wages for equal work, access to health care, nutrition, mortality, educational qualifications, top professional positions, career advancement speed, housing conditions, and many other issues and many of these issues cross-referenced with each other. With respect to these various issues, inequality analysis is looking at the differences between people or, better saying, in most cases, between human groups delineated by gender, migration status (and country of origin), location, age group, location of residence, etc.

So, inequality and related statements are several. A few of the dozens that exist are presented below. The purpose of which is certainly not to suggest a clear and/or exhaustive exposition, but simply to give an idea of the complexity of the

[22] [22] European Commission (2021). EU Multidimensional Inequality Monitoring Framework. EU website. Available at: https://knowledge4policy.ec.europa.eu/projects-activities/multidimensional-inequality-monitoring-framework_en
[23] Cattani, A. D. (2007). Socioeconomic inequalities: concepts and research problems. *Sociologias*, 3(SE), 0-0. Available at: http://socialsciences.scielo.org/pdf/s_soc/v3nse/scs_a01.pdf
[24] It is the prevalent phenomenon with respect to which socio-economic inequality is analyzed. But it is a restrictive approach. "Traditional measures of income inequality, such as the Gini coefficient, present a narrow view of inequality, as they do not account for disparities in health, mortality, living standards, nutrition, and social status across income groups in the society". Pandey, M. D., & Nathwani, J. S. (1996). Cit.

topic and also of the partial confusion (as just mentioned) that pertains to this matter.

> *"Inequality to respect to an attribute (e.g., income, mortality) implies a non-uniform distribution of that attribute in the population. The term socio-economic inequality is used in this paper to signify inequality in a broader sense, i.e., inequality with the respect to income, mortality and standard of living."*[25]

> *"Inequalities are sometimes perceived at an initial, superficial, localised and factual level: lack of food on one side, huge waste on the part of the privileged on the other; the most luxurious mansions standing just a few meters from poverty-stricken shanty towns; millionaires and their pets receiving advanced medical care and attention while millions of individuals lack medicine and basic healthcare. The picture of differences is often grotesque, pathetic or surreal."*[26]

> *"Social inequality is the existence of unequal opportunities and rewards for different social positions or statuses within a group or society (...) Social inequality has several important dimensions. Income is the earnings from work or investments, while wealth is the total value of money and other assets minus debts. Other important dimensions include power, occupational prestige, schooling, ancestry, and race and ethnicity."*[27]

> *"Economic inequality is an umbrella term for a) income inequality or distribution of income (how the total sum of money paid to people is distributed among them), b) wealth inequality or distribution of wealth (how the total sum of wealth owned by people is distributed among the owners), and c) consumption inequality (how the total sum of money spent by people is distributed among the spenders). Each of these can be measured between two or more nations, within a single nation, or between and within sub-populations (such as within a low-income group, within a high-income group and between them, within an age group and between inter-generational groups, within a gender group and between them etc, either from one or from multiple nations)."*[28]

> *"Inequalities exist twice: firstly objectively and secondly in the representations of the social world."*[29]

> *"Inequalities are not only driven and measured by income, but are determined by other factors - gender, age, origin, ethnicity, disability, sexual orientation, class, and religion. These factors determine inequalities of opportunity which continue to persist, within and between countries."*[30]

According to Piketty[31]:

> *"The notion of inequality can be associated with a series of definitions, depending on the perception of the different social groups and individuals, or according to the conceptions of the different sciences. From the point of view of economists, social inequalities are above all the result of the accumulation of capital by*

[25] Pandey, M. D., & Nathwani, J. S. (1996). Measurement of socio-economic inequality using the Life-Quality Index. *Social Indicators Research*, 39, 187-202.
[26] Cattani, A. D. (2007). Socioeconomic inequalities: concepts and research problems. *Sociologias*, 3(SE), 0-0. Available at: http://socialsciences.scielo.org/pdf/s_soc/v3nse/scs_a01.pdf
[27] Social inequality (2024). Available at: https://www.longdom.org/peer-reviewed-journals/social-inequality-6863.html
[28] Ventura, L. (2021). World Wealth Distribution and Income Inequality 2021. *Global Finance Magazine, January*, *11*.
[29] Lefebvre, Henri (1969). *Logique formelle et logique dialectique*. Paris: Anthropos
[30] United Nations (2020) UN75 and beyond. Available at: https://www.un.org/en/un75/inequality-bridging-divide#:~:text=Inequalities%20are%20not%20only%20driven%20and%20measured%20by,which%20continue%20to%20persist%2C%20within%20and%20between%20countries.
[31] Piketty T., (2013), *Le Capital au XXIème siècle*, Paris. Le seuil.

certain social groups (on a societal scale) or by certain nations (on a global scale) to the detriment of others. While this strictly economic approach can be measured using quantitative and statistical data, such materials are not sufficient for a detailed analysis of 'the socio-economic mechanisms that produce inequality."

Beyond the strictly economic definition, the sociological approach to inequality insists on the multidimensional and systemic nature of inequality[32], involving – beyond economic features – also cultural[33], historical and social factors that differentiate groups and individuals. Inequality should thus be understood as unequal access to elements that have 'value' in a given society (whether material or symbolic goods such as wealth, health conditions, level of education, cultural background socially recognised as legitimate, etc.). This means that inequalities are not just linked to belonging to a particular social class (being rich or poor, middle or upper class, etc.) but also to cultural, gender, socio-ethnic or religious membership or backgrounds[34].

1.2. Climate change exacerbates inequality

Aside from the obvious impacts of climate change on health and mortality[35], various studies have found evidence of the socioeconomic effects of climate change. Examining these effects, Dell et al.[36] noted that rising temperatures significantly reduces economic growth in poor countries, affecting agricultural productivity, manufacturing output and political stability. Burney et al.[37] demonstrated the powerful effects of climate change on agricultural yields and agricultural revenues, which could affect countries dependent on such produce[38]. Finally, Lenton et al.[39] estimated that climate change effects have already displaced approximately 600 million people, with a total of 3 billion people expected by the end of the century.

In this framework, it is well known that climate change exacerbates inequality and particularly affects certain vulnerability profiles including some of the most pronounced. Dasgupta et al.[40] suggested that global warming do not only affect average growth rate but increases already existing inequalities. Indigenous

[32] Galland O. and Lemel Y., (2018), *Sociologie des inégalités*, Paris, Armand Colin
[33] Rosça, D. (2019), Le capital social : clé d'analyse des inégalités dans une économie de pénurie. In *Le Grand Tournant de la société moldave : « Intellectuels » et capital social dans la transformation post-socialiste*, Paris: Presses de l'Inalco.
[34] FAIRVILLE (2024) D2.1 "Draft of a common glossary and common grid of analysis". FAIRVILLE (Facing Inequalities and democratic challenges through Co-production in Cities) is an Horizon Europe funded project implemented (also) by K&I. https://www.fairville-eu.org/
[35] Romanello M, Di Napoli C, Drummond P, et al. The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. The Lancet 2022; 400: 1619–1654. Munro A, Kovats RS, Rubin GJ, et al. Effect of evacuation and displacement on the association between flooding and mental health outcomes: a cross-sectional analysis of UK survey data. Lancet Planet Health 2017; 1: e134–e141. Gómez-Acebo I, Llorca J, Rodríguez-Cundín P, et al. Extreme temperatures and mortality in the North of Spain. Int J Public Health 2012; 57: 305–313.
[36] Dell, M., Jones, B. F., & Olken, B. A. (2012). Temperature shocks and economic growth: Evidence from the last half century. *American Economic Journal: Macroeconomics*, *4*(3), 66-95.
[37] Burney, J., McIntosh, C., Lopez-Videla, B., Samphantharak, K., & Gori Maia, A. (2024). Empirical modeling of agricultural climate risk. *Proceedings of the National Academy of Sciences*, *121*(29), e2215677121.
[38] Ercin, E., Kaune, A., Karaman, C., & Orlov, A. (2024). Unraveling cross-border climate risks through climate storylines: An example from Europe's cocoa industry. *Environmental and Sustainability Indicators*, *22*, 100359.
[39] Lenton, T. M., Xu, C., Abrams, J. F., Ghadiali, A., Loriani, S., Sakschewski, B., ... & Scheffer, M. (2023). Quantifying the human cost of global warming. *Nature Sustainability*, *6*(10), 1237-1247.
[40] Dasgupta, S., Emmerling, J., & Shayegh, S. (2023). Inequality and growth impacts of climate change—insights from South Africa. *Environmental Research Letters*, *18*(12), 124005.

peoples, and developing countries are frequently regarded as more vulnerable due to a lack of resources to adapt to climate change[41]. As stated by Şahin & Erensü[42]:

> *"The climate crisis exacerbates existing – gendered and intersectional – socio-economic inequalities"*

According to the United Nations:

> *"Within countries, people living in poverty and other vulnerable groups – including smallholder farmers, indigenous peoples and rural coastal populations – are more exposed to climate change and incur greater losses from it, while having fewer resources with which to cope and recover"[43]. Again, according to Levin and Patz, "people who are most vulnerable to the adverse environmental and health consequences of climate change include poor people, members of minority groups, women, children, older people, people with chronic diseases and disabilities, those residing in areas with a high prevalence of climate-related diseases, and workers exposed to extreme heat or increased weather variability."*[44]

Furthermore, the World Bank[45] and the OECD[46] point out that low-income households will be impacted disproportionately by the effects of climate change.

Going more in details, Huynh et al.[47] stated that rising temperature and precipitation levels exacerbates income inequality in several Asian countries. Issoufou-Ahmed et al.[48] attributed income inequality in sub-Saharan Africa to climate change vulnerability and Ashenafi[49] concluded that the greenhouse gas emissions widen income inequality in Africa. Mideksa[50] projected that climate shock reduces output in the sector with the strongest forward and backward linkage to the rest of the economy and redistributes income by changing the returns to inputs owned by various agents, raising income inequality in the case of Ethiopia. Baarsch et al.[51] and Alam et al.[52] evidenced similar impacts of climate change on income inequality in African countries and Malaysia. Bui et al.[53] stated

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[41] Diffenbaugh, N. S., & Burke, M. (2019). Global warming has increased global economic inequality. *Proceedings of the National Academy of Sciences*, *116*(20), 9808-9813.
[42] Şahin, U. & Erensü, S. (2020). Assessing the COVID-19 Pandemic and Climate Crisis Together. Istanbul: Istanbul Policy Center
[43] UNDESA (2020). World Social Report 2020. Available at: https://social.desa.un.org/development/desa/dspd/world-social-report/2020-2.html
[44] Levy, B. S., & Patz, J. A. (2015). Climate change, human rights, and social justice. *Annals of global health*, *81*(3), 310-322.
[45] World Bank (2024). The World Bank, Social Dimensions of Climate Change. https://www.worldbank.org/en/topic/social-dimensions-of-climate-change
[46] OECD (2016), Debate the Issues: New Approaches to Economic Challenges, OECD Insights, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264264687-en
[47] Huynh, C. M., & Hoang, H. H. (2024). Climate change and income inequality in Asia: how does institutional quality matter?. *Journal of the Asia Pacific Economy*, 1-25.
[48] Issoufou-Ahmed, O., & Sebri, M. (2024). On the transmission channels driving climate change-income inequality nexus in sub-Saharan A frican countries. *Business Strategy & Development*, *7*(1), e339.
[49] Ashenafi, B. B. (2022). Greenhouse gas emission widens income inequality in Africa. *Environmental Science and Pollution Research*, *29*(31), 46691-46707.
[50] Mideksa, T. K. (2010). Economic and distributional impacts of climate change: The case of Ethiopia. *Global Environmental Change*, *20*(2), 278-286.
[51] Baarsch, F., Granadillos, J. R., Hare, W., Knaus, M., Krapp, M., Schaeffer, M., & Lotze-Campen, H. (2020). The impact of climate change on incomes and convergence in Africa. *World Development*, *126*, 104699.
[52] Alam, M. M., Taufique, K. M. R., & Sayal, A. (2017). Do climate changes lead to income inequality? Empirical study on the farming community in Malaysia. *International Journal of Environment and Sustainable Development*, *16*(1), 43-59.
[53] Bui, A. T., Dungey, M., Nguyen, C. V., & Pham, T. P. (2014). The impact of natural disasters on household income, expenditure, poverty and inequality: evidence from Vietnam. *Applied Economics*, *46*(15), 1751-1766.

that natural disasters have significantly aggravated poverty and increased income inequality among households in Vietnam. Similar studies on the within country impacts of climate change exist for other countries such as Ethiopia[54], Philippines[55], Mexico, and India[56].

Looking, more specifically, at the world richest countries, it is highlighted that costs of extreme weather events, such as floods and storms, disproportionately affect lower-income households and these households face higher relative damages and have fewer resources to recover, leading to long-term income disparities[57].

In Europe:

> *"Extreme events like flooding from heavy rainfall or urban heat often cause worse impacts on certain vulnerable groups. These groups include people living in areas with low environmental qualities (green space and air quality), people with low socio-economic status, and people with physical conditions that present greater difficulties in preparing for, and in recovering from, climate change impacts. The reasons for these difficulties can lie in the lack of economic resources or, in particular, physical conditions like poor health, or living alone, or suffering from other social disadvantages like being a tenant or not understanding the national language"*[58]

Going into a specific territorial area, Reanos[59] evaluated the distributional effects of floods in Germany across different types of households and income levels, investigating at the relationship between several flood waves in Germany between 1993 and 2013 and inequality. The empirical findings suggest that the resulting economic costs associated with flood disasters exacerbate income inequality. Flood disasters disproportionately affect low-income households, with the greatest impact on families with dependent children and households with a person over the age of retirement. Odersky et al.[60] report a 3% income gap between impacted and unaffected households, among German households. Quiroga and Suarez[61] studied the impact of climate change and droughts on the average income distribution in rural Spain and demonstrate that droughts exacerbate rural farmers' income disparity (with some differences of the impact depending on farm location and crop type).

In United States:

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[54] Thiede, B. C. (2014). Rainfall shocks and within-community wealth inequality: Evidence from rural Ethiopia. *World Development*, *64*, 181-193.
[55] Sakai, Y., Estudillo, J. P., Fuwa, N., Higuchi, Y., & Sawada, Y. (2017). Do natural disasters affect the poor disproportionately? Price change and welfare impact in the aftermath of Typhoon Milenyo in the rural Philippines. *World Development*, *94*, 16-26.
[56] Sedova, B., Kalkuhl, M., & Mendelsohn, R. (2020). Distributional impacts of weather and climate in rural India. *Economics of Disasters and Climate Change*, *4*, 5-44.
[57] Botzen, W. W., Deschenes, O., & Sanders, M. (2019). The economic impacts of natural disasters: A review of models and empirical studies. *Review of Environmental Economics and Policy*.
[58] Breil, M., Downing, C., Kazmierczak, A., Mäkinen, K., & Romanovska, L. (2018). Social vulnerability to climate change in European cities: state of play in policy and practice.
[59] Reaños, M. A. T. (2021). Floods, flood policies and changes in welfare and inequality: Evidence from Germany. *Ecological Economics*, *180*, 106879.
[60] Odersky, M., & Löffler, M. (2024). Differential exposure to climate change? Evidence from the 2021 floods in Germany. *The Journal of Economic Inequality*, *22*(3), 551-576.
[61] Quiroga, S., & Suárez, C. (2016). Climate change and drought effects on rural income distribution in the Mediterranean: a case study for Spain. *Natural Hazards and Earth System Sciences*, *16*(6), 1369-1385.

> *"People who struggle financially prior to the disaster often experience the worst short- and long-term financial impacts from floods, including harm to credit scores, increases in debt, and increased likelihood of defaulting on mortgages or declaring bankruptcy. Disasters have also been shown to increase wealth inequality over time, exacerbating income and wealth inequalities within the community"*[62].

Belasen and Polachek[63] referred to hurricanes in the United States as exogenous shocks to economic performance which affects wages and size of the labour force. In locations directly affected by natural disasters, employment drops while earnings rise, indicating a negative labour supply impact but altered labour demand in specific sectors. Also, neighbouring locations experience an influx of workers, leading to stable employment but reduced earnings due to a positive labour supply shock. Emphasising the long-lasting effects of extreme weather events, Lynham et al.[64] reported that even after many years of Hawaii's devasting tsunami, unemployment in the affected city remains 32% higher and population was still 9% lower than it would have been if the tsunami had not occurred.

Adopting a worldwide perspective IPCC noted that there is high confidence in stating that vulnerability to climate change is exacerbated by inequity and marginalisation linked to e.g., gender, ethnicity, low incomes, informal settlements, disability, age, and historical and ongoing patterns of inequity such as colonialism, especially for many indigenous peoples and local communities[65].

Looking now, more in depth, at gender inequality, it has been found that this phenomenon is significantly impacted by climate change. Women, particularly those in rural and lower-income communities, are more vulnerable to the adverse effects of climate change due to existing social and economic disparities.

> *"Female-headed households experience annual average income losses greater of 8 percent due to heat stress and 3 percent due to floods, relative to male-headed households. Exposure to flood and heat stress reduces the total incomes of rural female-headed households in low- and middle-income countries by US$ 16 billion and US$ 37 billion, respectively, relative to male-headed households. Farm plots managed by women lose significantly more in terms of crop value than those managed by men during heat stresses... Women take on an additional work burden compared to men when extreme weather events occur but also lose more."*[66]

Moreover, on one hand, women are more likely to experience job losses in climate-sensitive sectors and have fewer opportunities to transition into new

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[62] Smith, K. (2023). The unequal impacts of flooding. Headwaters Economics website. Available at: https://headwaterseconomics.org/natural-hazards/unequal-impacts-of-flooding/

[63] Belasen, A. R., & Polachek, S. W. (2009). How disasters affect local labor markets: The effects of hurricanes in Florida. *Journal of Human Resources*, *44*(1), 251-276.
Lynham, J., Noy, I., & Page, J. (2017). The 1960 tsunami in Hawaii: long-term consequences of a coastal disaster. *World Development*, *94*, 106-118.

[65] IPCC (2023). AR6 Synthesis report. Climate change 2023. IPCC website. Available at: https://www.ipcc.ch/report/sixth-assessment-report-cycle/

[66] WeAdapt (2024). The unjust climate: Measuring impacts of climate change on rural poor, women and youth. UNDRR website. Available at: https://www.preventionweb.net/news/unjust-climate-measuring-impacts-climate-change-rural-poor-women-and-youth#:~:text=Gender%20disparities%20in%20climate%20vulnerability,to%20services%20in%20rural%20areas.

employment areas, thereby increasing economic disparities between men and women[67]; on the other hand, women are much more underrepresented in green jobs, which improve environmental sustainability or reduce greenhouse gas emissions, than in polluting jobs (e.g., just 6% of women who work in advanced economies hold green jobs, compared to over 20% of working men)[68]. In a few words, poverty, inequality, and cultural norms, make women more vulnerable to the impacts of climate change. If these underlying inequalities were addressed, it would create a more level playing field, allowing for a more accurate comparison of how climate change affects different genders[69]. Finally, climate change can worsen gender disparities by impacting women's health, education, and economic opportunities[70].

The intersectionality of income, wealth, and gender inequalities reveals a complex web of socioeconomic disparities exacerbated by climate change[71]. These inequalities are not isolated but interact in ways that compound their effects "low-income women in Southern Europe face a double burden of income and gender inequality, making them particularly vulnerable to climate impacts"[72].

1.3. Inequalities exacerbate climate change

Not only does climate change exacerbate inequalities (and vulnerability to climate change is exacerbated by inequity and marginalisation), but also socio-economic inequalities exacerbate climate change.

In 2019, the richest 1% of the planet (77 million people) was responsible for 16% of global CO_2 emissions from consumption, a share greater than that produced by all the cars in circulation and other means of road transport. In turn, the richest 10% of the world's population was responsible for half of global emissions; those in the richest 1% by income pollute on average in 1 year as much as a person belonging to the remaining 99% of humanity would pollute in 1,500 years. In Italy, in 2019, the top 10% emitted 36% more than the poorest 50% of the population. Every year, the emissions of these super-rich effectively cancel out the reduction in CO_2 emissions resulting from the use of almost a million wind turbines[73].

[67] Jordan, J. C., Abhilashi, R., & Shaheen, A. (2021). Gender-sensitive social protection in the face of climate risk. *A study in Uttar Pradesh, Rajasthan, and Madhya Pradesh, India*.
[68] Fabrizio S., Jaumotte F. and Travares M.M. (2024). Why Women Risk Losing Out in Shift to Green Jobs. IMF Blog. Available at: https://www.imf.org/en/Blogs/Articles/2024/10/07/why-women-risk-losing-out-in-shift-to-green-jobs
[69] Change, C. C. (2014). Tackling the Double Injustice of Climate Change and Gender Inequality. *CARE Climate Change.*. Available at: https://careclimatechange.org/wp-content/uploads/2019/06/Double_Injustice.pdf
[70] Chowdhury JR, Parida Y, Goel PA. (2021). Does inequality-adjusted human development reduce the impact of natural disasters? A gendered perspective. World Dev 2021; 141: 105394
[71] MacGregor, S., Arora-Jonsson, S., & Cohen, M. (2022). Caring in a changing climate: Centering care work in climate action.
[72] Lomborg, B. (2020). Welfare in the 21st century: Increasing development, reducing inequality, the impact of climate change, and the cost of climate policies. *Technological Forecasting and Social Change*, *156*, 119981.
[73] Stockholm Environment Institute (2023). Commitment to impact. Annual report 2023 Available at: https://www.sei.org/wp-content/uploads/2024/04/seip10720-annual-report-240426b-web.pdf.

Figure 7 – Climate change and inequality: the rich pollute, the poor suffer

Source: https://www.economist.com/finance-and-economics/2017/07/13/climate-change-and-inequality

So, there seems to be (also) a strong connection between inequality and climate change. Those who are better off, both as countries and as human groups within a country, exacerbate climate change[74], while, vice versa, climate change tends to hit the most vulnerable groups, or at least some of them, harder (i.e., vulnerable people are facing a disproportionate share of the risks). As stated recently in the National Geographic

> *"Those already living below the poverty line, the young and the old, ethnic minorities and indigenous peoples: these are the groups most disproportionately affected by climate impacts. And in many cases these groups of people are the ones who have contributed least to creating the problem. In this sense, climate change is profoundly inequitable"*[75].

This will continue to be dramatically true. However, at least in Europe, the reverse may also gradually become true. Indeed, the weight of the most disadvantaged groups in the production of emissions is gradually increasing and is expected to continue to increase in the future, albeit only in relative terms. Three examples of this process are given below.

1. Vulnerable micro-entrepreneurs - It is known that in the industrial sphere multiple actors, starting with the European Commission, are implementing functional measures for the adoption by enterprises of measures (even drastic ones) for energy efficiency and, where possible, transition to renewable energy. To this end, the European Commission requires all

[74] Obviously taking it for granted that human activities and, specifically, CO2 emissions determine climate change. See No doubt left' about scientific consensus on global warming, say experts (2019). Available at: https://www.theguardian.com/science/2019/jul/24/scientific-consensus-on-humans-causing-global-warming-passes-99

[75] https://www.pewtrusts.org/en/research-and-analysis/articles/2023/05/22/people-whove-contributed-least-to-climate-change-are-most-affected-by-it

companies[76], except for non-energy-intensive SMEs, to conduct functional energy audits to identify what needs to be done (which then, should actually be done). For non-energy-intensive SMEs, audits and, more importantly, the adoption of measures to decrease their emissions, are "only" recommended. In the frame of the Horizon 2020 project called INNOVEAS, K&I implemented a study[77] in this regard discovering that small and micro-entrepreneurs who do nothing in this respect are mainly those in severe economic hardship, including micro-enterprises led by people in poverty, migrants or the elderly. There are, of course, exceptions: those who bet precisely on green to get out of a crisis situation and, often, succeed[78]. But in general, the more you are in a distressed condition, the less "virtuous" you are[79]. What has just been said is even more relevant when we consider that, according to the World Bank, there are 322 million SMEs in the world (according to the latest available data from 2019), the vast majority of which are micro-enterprises, and that their number is growing at a rate of 3% per year[80]. Moreover, according to the UN[81], SMEs account 50% of GDP worldwide.

2. Fossil fuel vehicles - The fossil fuel vehicles market is literally bogging down the battle against climate change. While many developed nations have pledged to phase out gasoline and diesel vehicles over the next two decades, the transition will be more complicated in developing countries, where old cars imported from Europe, Japan and the United States are often the only affordable option[82]. An old gas-powered car has a good chance of ending up on a cargo ship[83]. Old vehicles from Western Europe are typically shipped to Eastern Europe. When they reach the end of their useful life but are still roadworthy, they move south to Africa. Scrapped cars from North America are transported to developing countries in South America; vehicles from Asia are shipped across the continent until they are no longer popular with consumers there, before heading to Africa. In this context, the good news is that more and more people are replacing their fossil fuel vehicles with cleaner alternatives, including full-electric or hybrid cars. This is increasingly happening in advanced countries (Europe, North America, etc.). If until a few years ago the electric car represented a niche choice, the sales of zero-emission vehicles have now taken on an extremely significant weight. In 2022, for the first time in history, exclusively battery-powered cars sold worldwide exceeded 10 million units, reaching 14% of the total market.

[76] Support Schemes for Energy Audits and Energy Management Systems as required by Art. 8/2 of the Energy Efficiency Directive (2012/27/EU)
[77] INNOVEAS (2023). *Deliverable 2.2 Assessment of non-technical barriers*. Available at: https://innoveas.eu/wp-content/uploads/2020/04/INNOVEAS_WP2_State-of-the-art-needs-and-barriers-assessmentD2.2-Assessment-of-non-technical-barriers.pdf
[78] Quinti G. (eds.) (2024). RL4 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is an Horizon 2020 funded project implemented (also) by K&I
[79] INNOVEAS (2023). Cit.
[80] Haider, K., Khanna, M., Kotei, M., Kushnir, K., Singh, S., & Sridhar, T. (2019). Micro, Small, and Medium Enterprises-Economic Indicators (MSME-EI) Analysis Note. *World Bank Group*. Available at: https://documents1.worldbank.org/curated/en/873301627470308867/pdf/Micro-Small-and-Medium-Enterprises-Economic-Indicators-MSME-EI-Analysis-Note.pdf
[81] UNDESA (2024). Leveraging the Power and Resilience of Micro-, Small and Medium-sized Enterprises (MSMEs) to Accelerate Sustainable Development and Eradicate Poverty in Times of Multiple Crises. Available at: https://www.un.org/en/observances/micro-small-medium-businesses-day
[82] https://www.innatura.info/auto-inquinanti/
[83] https://www.wired.it/article/auto-dove-finiscono-auto-usate-benzina/

In Europe, it went from 5% in 2020 to 14.3% in 2023[84]. However, despite the incentives, and despite the existence of a second-hand market, electric cars are only bought by those who, first of all, have the money to change their car and, moreover, to do so certainly not for the less expensive ones which are certainly not electric cars (neither among the new ones, nor among the used ones)[85]. The most disadvantaged people, even in Europe, are mostly forced to keep polluting cars for as long as they can.

3. Buildings' energy efficiency - One of the most effective ways to fight energy poverty is to improve the energy efficiency of buildings. This can be done through improvements in construction and insulation, among others[86]. Nevertheless, building interventions that are functional to energy efficiency and the transition to renewable energy are very expensive to be effective. Therefore, only wealthy people or those who can benefit from very strong incentives or financing schemes that are functional to combating energy poverty can afford them. Which often doesn't happen, not even at a much more basic level. Currently, for instance, the official number of households living in a low-income household with poor energy efficiency in England in 2022 was 3.26 million (however, it is estimated it is actually a lot more than that ranging from 4.1 to 7.5 million); and recent evidence published by the University of York stated that 32% of households identified in fuel poverty will not be helped by the existing governmental support[87].

Thus, it could happen that the most disadvantaged people would become people who will contribute to climate change, not having the assets to adopt virtuous measures in the way they live (mobility, housing) and work (enterprise). This is absolutely marginal today (indeed, by 2030, it is expected, in reverse, that carbon emissions from the richest 1% will be 22 times higher than the level compatible with the goal of limiting global warming to 1.5°C, set by the Paris Climate Agreement[88]), but may tend to become more important in the future.

1.4. Circularity

The relationship between the increase in inequality and climate change would therefore be circular (A is among the causes of B; and B is among the causes of A), but it is an imperfect bi-univocity, considering the complexity of the social context. That is, climate change influences some aspects of inequality; while other (or even other) aspects of inequality influence climate change. Broadly speaking, it is interesting to consider how the relationship between climate change and inequalities could spark discussions on causality – a potential 'chicken and egg' situation. However, this discussion falls beyond the scope of this deliverable.

[84] https://www.motus-e.org/faq-items/quante-auto-elettriche-si-vendono-nel-mondo-in-europa-e-in-italia/
[85] In Italy, prices are still the main barrier to purchasing electric cars and among those most likely to buy an electric car there are above all families with parents with a high level of education and who own more than one car. See: https://moveo.telepass.com/lidentikit-di-chi-compra-auto-elettrica/#:~:text=L'acquirente%20tipo%20viene%20dal,di%20un%20gruppo%20di%20acquisto.
[86] https://www.edp.com/en/edp-yes/fighting-energy-poverty-key-strategies
[87] https://www.theaccessgroup.com/en-gb/blog/hsc-fuel-poverty-what-is-it-and-how-can-it-be-tackled/
[88] Stockholm Environment Institute (2023). Commitment to impact. Annual report 2023 Available at: https://www.sei.org/wp-content/uploads/2024/04/seip10720-annual-report-240426b-web.pdf.

2. The unintended effects of climate policies on inequality

Inequality can be taken as a critical lens for examining any social and economic policy, as policies are applied to various human groups and have impacts on them, which are or can be very diverse, precisely by virtue of the inequalities we have quickly discussed. This applies, of course, for all intents and purposes, also to climate change policies, if only in that climate change poses, as it has been highlighted in the previous section, higher threat to exposed and vulnerable countries, communities, and social groupings. Indeed, low-income groups,

We will therefore focus the attention on the adaptation to, and mitigation policies related to climate change bearing in mind that there are trade-offs and overlaps between these policies[89]. Through successful and relevant adaptation policies, it should be avoided, among other things, that climate change will affect the most and especially the disadvantaged people; while mitigation policies should be conceived in such a way that it does not result that disadvantaged people, remaining mostly excluded from them, and risk to become, themselves, a cause of climate change.

2.1. Unintended effects of some adaptation policies

The review carried out has allowed us to highlight some policy/measures related to adaptation to climate change that are sometimes problematic because they affect certain categories of disadvantaged people or are not viable for them.

Houses in flooded areas

Housing usually represents the highest losses due to natural disaster[90]. It follows, as we have already said, that one of the main adaptation measures consists in prohibiting the construction of houses, and any other human settlement, in the areas most prone to natural hazards (such as, for example, frequently flooded areas or areas subject to landslides). Sometimes, these are poorly constructed or dilapidated homes can collapse or suffer structural damage in the event of these natural disasters. This is a phenomenon whose severity is growing considerably:

> *"Across the fast urbanizing developing world, the number of people living in substandard housing is expected to more than double to 3 billion over the next 15 years. These homes are under threat from earthquakes, floods, hurricanes, and other disasters"*[91].

[89] In this section we'll mention measures that have positive effects both on mitigation and on adaptation (e.g., innovative code and standards for buildings, or reforestation, or building green roofs to reduce both urban heat island effects; and also emissions). There are also measures functional to adapting to climate change that have harmful effects in terms of mitigation (e.g., more air conditioning, which requires an abnormal consumption of energy, often also coming from fossil fuels).

[90] Tran, T. A., Tran, P., Tuan, T. H., & Hawley, K. (2013). Review of housing vulnerability: Implications for climate resilient houses. *The Sheltering Series* No. 1: Sheltering From a Gathering Storm. Available at: https://cdkn.org/sites/default/files/files/Sheltering-from-a-gathering-storm-Discussion-Paper-Series-Review-of-Housing-Vulnerability.pdf

[91] See: The housing challenge for vulnerable communities. Available athttps://www.ennomotive.com/housing-challenge-in-vulnerable-communities/; World Bank (2022). Global Program for Resilient Housing. World Bank website. Available at: https://www.worldbank.org/en/topic/disasterriskmanagement/brief/global-program-for-resilient-housing

Furthermore, it is considered to move the people, who currently live in these areas, encouraging them to go and live elsewhere. Very often, these houses and areas are inhabited by the most disadvantaged people: poor people, irregular migrants, discriminated people[92] and these are people who do not have the capacity or have considerable difficulty in going to live elsewhere (e.g., the case of Tabota in Benin[93]), despite any incentives. So, in many cases, vulnerable people moved in case of flooding, to safer part of city and outside of city, but returned to their original place as soon as floodwaters were gone (e.g., the case of Srinagar City, the largest Himalayan urban centre[94]).

Therefore, this policy, certainly correct, in the ways in which it is implemented sometimes or often turns out to be inadequate for the most vulnerable people

Conversely, there are also examples of vulnerable communities successfully relocation to safer housing. Since 2003, for instance, the Piemonte Region in Northern Italy has been devising and implementing an anticipatory relocation policy for residential buildings at hydro-geological risk. Residential property owners participate in a voluntary buyout scheme and move to safer areas within the same province with public funding support[95].

Deforestation/Reforestation

Reforestation, as part of a broader adaptation policy, involves planting trees in areas that have lost their tree cover, aiming to enhance ecosystem resilience and mitigate climate change impacts. It can be a win-win for climate mitigation and adaptation, improving biodiversity, and supporting human well-being[96].

> *"To combat the natural disasters, we have to reforest the 2 billion hectares of degraded farmland (…) If we plant trees – for example – on a mountain slope, trees will reduce avalanches"[97]. So, forest-based solutions correspond to "forests used or managed for mitigating natural hazards linked to gravity (rockfalls and avalanches) or to water (floods and drought), while preserving, restoring or managing biodiversity."[98]*

As already underlined, this measure is win-win having in mind adaptation and mitigation, but it is not a triple-win, including social vulnerability. Indeed:

> *"Deforestation is a cruel process, having its most devastating impact on the most vulnerable populations (…). There are many causes for deforestation, including*

[92] Satterthwaite D. (2017). Addressing the needs of vulnerable groups in urban areas. UNDRR website. Available at: https://www.preventionweb.net/blog/addressing-needs-vulnerable-groups-urban-areas
[93] Volta Flood and Drought Management project -Voices from the field (2024). Available at: . https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/02/Voices-from-the-field_VFDM-26-06-2024.pdf
[94] Wani, G. F., Ahmed, R., Ahmad, S. T., Singh, A., Walia, A., Ahmed, P., ... & Mir, R. A. (2022). Local perspectives and motivations of people living in flood-prone areas of Srinagar city, India. *International Journal of Disaster Risk Reduction*, *82*, 103354.
[95] Climate-Adapt case-study: "Preventive relocation of households at high hydrogeological risk in Piemonte (Italy)"-2024, available at: https://climate-adapt.eea.europa.eu/en/metadata/case-studies/preventive-relocation-of-households-at-high-hydrogeological-risk-in-piemonte-italy . From 2009 to 2024, the total cost of the buyout scheme amounted to 5 347 715.51 EUR. It includes purchasing costs (transfers to households, € 4 730 918.7 EUR - spent) and demolition costs (€ 1 116 868.66 EUR spent and pledged)
[96] Afforestation and reforestation as adaptation opportunity. Climate-Adapt platform. Available here.
[97] Groasis, Avoid natural disasters by planting trees Available at: https://www.groasis.com/en/planting/how-to-prevent-natural-disasters
[98] Rey, F., Dupire, S., & Berger, F. (2024). Forest-based solutions for reconciling natural hazard reduction with biodiversity benefits. *Nature-Based Solutions*, *5*, 100114.

logging, grazing, and commercial agriculture. One of the saddest causes, however, is the fact that many subsistence farmers contribute to the removal of trees out of desperation. Many farmers understand that trees are important for the long-term health of their land, but when faced with the immediate needs of their families, they must take down trees for a quick profit. Some people will harvest trees to turn into charcoal to quickly earn cash. In other places, forest areas are cleared and burned to be used as extra land for farming. Eventually, these areas lose so many trees that soil and water are left unprotected."[99]

So, it is quite evident that reforestation policies (double win for mitigation and adaptation), may also be inadequate for the most vulnerable people.

Moreover, reducing emissions from deforestation and forest degradation (REDD+), while is an important and cost-effective climate change mitigation strategy, has had mixed impacts on communities' social-ecological resilience, has also limited communities' ability to manage for uncertainty through restrictions on local forest practices, rigidity in rules, and 'locking-in' of communities' natural capital through carbon contracts.[100]

Instalments of protected areas

Protected areas are crucial climate policies, acting as both carbon sinks and biodiversity havens, while also contributing to adaptation by preserving ecosystem services and resilience to climate change impacts[101]. Protected areas, while vital for biodiversity, can have unintended social consequences, including displacement, economic hardship, and increased human-wildlife conflict, particularly when implemented through exclusionary approaches. More specifically, protected areas can lead to the forced relocation of communities living within or near the designated area, disrupting their traditional ways of life and social structures[102]. Moreover, restrictions on resource use, such as logging, grazing, or fishing, can severely impact the livelihoods of local communities, leading to poverty and economic hardship[103]. These local communities they may not even be disadvantaged people, but as a result of these phenomena they become (or at least are at risk of becoming) vulnerable people. Therefore, this policy can create – and in fact does create – conditions of social vulnerability. Finally, exclusionary conservation practices can lead to the loss of cultural heritage and identity, as people are denied access to landscapes with historical and symbolic meaning[104].

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[99] PWP-Plant with purpose (2018). The brutal connection between poverty and deforestation. Available at: https://plantwithpurpose.org/stories/poverty-deforestation/

100 Hajjar, R., Engbring, G., & Kornhauser, K. (2021). The impacts of REDD+ on the social-ecological resilience of community forests. Environmental Research Letters, 16(2), 024001. Avaialble at: iopscience.iop.org/article/10.1088/1748-9326/abd7ac#:~:text=Our%20meta%2Danalysis%20found%20that,enhanced%20potential%20for%20local%20adaptability

[101] IUCN/WCPA. (n.d.). Natural solutions - Protected areas helping people cope with climate change. Available at: https://portals.iucn.org/library/sites/library/files/documents/Rep-2011-021.pdf

[102] Woodhouse, E., Bedelian, C., Dawson, N., & Barnes, P. (2018). Social impacts of protected areas: Exploring evidence of trade-offs and synergies. In *Ecosystem Services and Poverty Alleviation (OPEN ACCESS)* (pp. 222-240). Routledge.

[103] Miranda Montero, J. J., Wright, E. M., & Khan, M. N. (2020). Illegal logging, fishing, and wildlife trade: The costs and how to combat it. Available at: https://thedocs.worldbank.org/en/doc/482771571323560234-0120022019/original/WBGReport1017Digital.pdf#:~:text=Design%20and%20implementation%20of%20national%20solutions%20should,and%20opportunities%20to%20promote%20legal%20alternative%20livelihoods.&text=Without%20greater%20investments%20and%20coordinated%20action%20at,growth%20and%20social%20stability%20i

[104] Giombini, L. (2020). Heritage sites and the challenges of tomorrow. Aesthetica Preprint, (114), 59-78.

All this without denying some positive influences on poverty reduction, family incomes, household expenditure, employment, forest cover, biodiversity, carbon sequestration, and a reduction in forest fragmentation[105]. Indeed:

> *"Protected areas are controversial, and it is hard to find a win-win solution to conservation and development"*[106].

Early Warning System development

Of all risk reduction and climate change adaptation measures, early warning and early action stand as one of the best-proven and cost-effective methods to save lives and reduce the economic impact of natural hazards[107].

As already stated, the impact of hazards is unequally distributed and disproportionately affects the most vulnerable communities. So, Early Warning Systems (EWS) are considered as essential to protect these vulnerable communities, to promote resilience, and to achieve the global development agenda[108]. However, one-third of the world's population still lacks EWS, mainly in less developed countries, while in Europe, there is a considerable experience with EWS, especially for flood and flash-flood risk, storms, forest fires, heatwaves and droughts[109]. Moreover, where EWS exist and are effectively functioning, they often do not reach the most vulnerable people. In the 2020 paper 'A systematic review of community engagement in disaster EWS'[110], it is highlighted that:

> *"EWSs have traditionally focused on technology and infrastructure with the absence of comprehensive engagement with the community across the four EWS elements of risk knowledge, monitoring, dissemination and communication and response capability. Subsequently, past experience shows inappropriate responses by communities during disasters".*

So, often EWS are reaching people well connected: those who using advanced ICTs that have the possibility of a two-ways communication with those who manage the system; and also those who received risk information via radio, or television (one-way communication here); while *"other vulnerable groups in such locations e.g., the disabled, illiterate or old people may not receive information"*[111]. More specifically as regards disabled people, it has been highlighted that "despite the fact that there are an estimated 600 million persons with disabilities in the world, very little has been done to create inclusive and comprehensive EWS which meet the needs of individuals with physical or cognitive impairments"[112].

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[105] Ma, B., Zhang, Y., Hou, Y., & Wen, Y. (2020). Do protected areas matter? A systematic review of the social and ecological impacts of the establishment of protected areas. Inter*national journal of environmental research and public health*, 17(19), 7259. Available at: https://pmc.ncbi.nlm.nih.gov/articles/PMC7579073/
[106] Brockington, D., & Wilkie, D. (2015). Protected areas and poverty. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *370*(1681), 20140271.
[107] UNDRR (2024). Early Warnings for All. Available at: https://www.undrr.org/implementing-sendai-framework/sendai-framework-action/early-warnings-for-all
[108] Earling Warning Systems. Available at: https://www.unesco.org/en/disaster-risk-reduction/ews
[109] European Early Warning Systems. Available at: https://climate-adapt.eea.europa.eu/en/observatory/evidence/health-early-systems
[110] Sufri, S., Dwirahmadi, F., Phung, D., & Rutherford, S. (2020). A systematic review of community engagement (CE) in disaster early warning systems (EWSs). *Progress in Disaster Science*, 5, 100058.
[111] Sufri, S., Dwirahmadi, F., Phung, D., & Rutherford, S. (2020). Cit.
[112] Osterwalder, K., Yea Cha, J., Pickles, J., Batchelor, C., & Stowe, C. (2021). Towards disability transformative Early Warning Systems: Barriers, challenges, and opportunities. Available at: https://zcralliance.org/resources/item/towards-disability-transformative-early-warning-systems-barriers-challenges-and-opportunities/

Similar issues are also pointed out in various reports by international organisations[113]. So, even for EWS, therefore, there is a question of the appropriateness of this adaptation measure with respect to the most vulnerable people. It must be said, however, that much is being done to try to solve this problem. For example, in Côte d'Ivoire, a WhatsApp group has been created which includes actors ranging from Sodexam (the national meteorological agency) to French-speaking people from some flood-affected village communities in the province of Bondoukou (North-East) as that of the remote village of Sangabili. Through this WhatsApp group a HYDRO METEO bulletin reaches in real time the Community (in particular people of the Youth Association, all French-speaking). And they themselves can enter information, including feedback, into the WhatsApp group. Then, the information is disseminated to the rest of the population in local languages through the Community's loudspeakers in both the community languages[114].

Broadly speaking, the United Nations launched in 2022 the worldwide program Early Warning for All "to ensure that everyone on Earth is protected from hazardous weather, water, or climate events through life-saving early warning systems by the end of 2027"[115].

Increased and shared preparedness

As a fourth example, we can refer to all the measures that fall under people's preparedness (EWS could be consider among these, but, in our opinion, it is more appropriate to range EWS in the Emergency phase). In this regard:

> *"An inclusive approach to disaster preparedness saves lives (...) But in reality, certain groups of people are often left out due to their inherent characteristics such as age, disability, gender, religion, and social status. As a result, these people become more vulnerable to disasters."*[116]

Many barriers are identified to conduct preparedness activities for vulnerable groups[117]:

a. Difficulty in identification of vulnerable population (even when one is aware – and very often this is not the case – of what has been said about intersectionality, it often remains difficult to concretely identify and map the various types of vulnerable people in the territory)
b. Poor availability of preparedness measures for vulnerable groups (Preparedness measures are often conceived without taking into account

[113] At this regard see: CREWS & IFRC (2021). People centred early warning systems: learning from national red cross and red crescent societies (https://www.ifrc.org/document/people-centred-early-warning-systems); IFRC (2009). World Disasters Report 2009. (https://reliefweb.int/report/world/world-disasters-report-2009-focus-early-warning-early-action); CREWS (2016). CREWS Operational Procedures Note No 1 Programming and Project Development (https://wmo.int/files/revised-crews-operational-procedures-note-no-1-programming-and-project-development)
[114] Volta Flood and Drought Management project - Voices from the field (2024). Available at: . https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/02/Voices-from-the-field_VFDM-26-06-2024.pdf.
[115] United Nations (2022). Early Warnings for All (https://www.un.org/en/climatechange/early-warnings-for-all).
[116] ReliefWeb (2018). Facilitating inclusion in disaster preparedness: A practical guide for CBOs (https://reliefweb.int/report/world/facilitating-inclusion-disaster-preparedness-practical-guide-cbos).
[117] Sekar, K., Jayakumar, C., Patrick, J. (2023). Psychosocial Preparedness. National Disaster Management Training Module (number 3). Available at: https://ndma.gov.in/sites/default/files/PDF/Technical%20Documents/NDMA-Module-3.pdf.

the enormous differences within the human groups that inhabit a territory, even in the best cases where the specific context has been carefully considered)

c. Inadequate coordination among stakeholders (There are many actors involved in community preparedness enhancement; and they are also very diverse among themselves, including public and non-profit entities that have expertise on a specific type of vulnerability – e.g., those who take care of children, or the elderly; or the disabled; or migrants – so, it is very difficult to ensure adequate coordination between so many different actors)
d. Lack of policies and plans promoting preparedness among vulnerable groups (also due to the above, tailor-made measures on specific human groups are lacking; and therefore, often, plans and policies, even when they deal with vulnerable subjects, do so in a generic way)
e. Lack of trust (of vulnerable people) towards the stakeholders due to past negative experiences also because in the past the specificities of socially vulnerable subjects have been taken into account, if anything even less; and therefore, many people believe that policies leave them and will leave them behind.

So, even in many preparedness measures, the issue of their appropriateness with respect to the most vulnerable people still stands out in a pretty substantial way.

National adaptation plans

It can also be added that while some progress is being made, many national adaptation plans across Europe still fall short in effectively addressing gender equality and the inclusion of vulnerable populations. Specifically, a significant number of plans lack adequate sex-disaggregated data[118], fail to provide targeted support for women-led climate initiatives, and lack participatory governance structures that ensure meaningful inclusion of vulnerable groups[119].

Emergency management

The analysis of climate change adaptation measures and policies could continue and could lead us to identify further inadequacies of such policies/measures with respect to the issue of social vulnerability. However, we think that the examples above can be enough, and we will limit ourselves to adding that the same inadequacy problem still arises with reference to the management of emergency situations. In a study carried out in Italy by K&I in the aforementioned ACCTING project, it emerges that in Florence (one of the most-advanced civil protection system in Italy and most sensitive to societal issues), albeit there seems to be a strong awareness by the authorities of the existence of differentiated vulnerability profiles in the management of emergencies, there are still some limitations at this regard. This awareness

[118] OECD-UNDP (2024). Investing for gender equality and inclusive climate action; UNDP-OECD cross regional dialogue in Istanbul, Türkiye. Available at: https://www.undp.org/sites/g/files/zskgke326/files/2024-11/outcomes_document-investing_for_gender_equality_and_inclusive_climate_action.pdf
[119] UNFCCC (2023). Advancing Gender-Responsive Climate Action: Policy Brief Reveals Progress and Challenges. Available at: https://unfccc.int/news/advancing-gender-responsive-climate-action-policy-brief-reveals-progress-and-challenges.

seems to be primarily dictated by the principle that those who are worse off should be helped as a priority or with special precautions, having an exclusive interest in the practical aspects of vulnerability related to mobility, communication or food to be provided, for which the elderly, children, the disabled, migrants, autistic and celiac people are often mentioned. Conversely, there seems to be no awareness or interest on many other vulnerability profiles related, for instance, to socio-economic conditions, gender identity or mental issues and much less on intersectional vulnerability profiles[120].

2.2. Unintended effects of some mitigation policies

The implemented review has allowed us to highlight some measures relating now to mitigation of climate change which are sometimes problematic, as they affect some categories of disadvantaged people (remaining mostly excluded from them) or are not viable for them.

Deforestation/Reforestation

Reforestation and the fight against deforestation, in addition to being functional to the adaptation to climate change, are also very important for the mitigation of climate change[121]. Therefore, what was said in the previous paragraph applies here too: it is highlighted that these measures may be inadequate for the most vulnerable people; which therefore often hinder the adoption of mitigation measures in this regard.

Instalments of protected areas

Protected areas too, as stated above, in addition to their positive function for adaptation, are acting also as carbon sinks, so for mitigating climate change. Therefore, again, what was said above in the previous paragraph applies here too.

Decarbonisation in industry

Decarbonising the mining industry where coal or other fossil fuels are used extensively involves reducing greenhouse gas emissions through strategies like transitioning to renewable energy, improving energy efficiency, electrifying operations, and implementing carbon capture technologies, all aimed at meeting climate goals[122]. This entails the closure of coal mines or industrial plants as well as other de-industrialisation programs (mitigation pathways entailing important reductions of emissions), which imply large and sometimes

[120] Quinti, G., Cacace, M. (eds.) (2024). RL1 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I.

[121] A similar policy with positive effects both for mitigation and adaptation is the incorporation of green and blue space to prevent flooding (→ Adaptation) and sequester carbon (→ Mitigation). This policy should "*provide equitable access to resources that reduce social and health inequalities. However, no previous review has attempted to consolidate this evidence*" (See Tate, C., Wang, R., Akaraci, S., Burns, C., Garcia, L., Clarke, M., & Hunter, R. (2024). The contribution of urban green and blue spaces to the United Nation's sustainable development goals: an evidence gap map. Cities, 145, 104706.), as this study does. It is highlighted f.i. that urban green and blue space "*build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events*" (see Moser, C. O., & Satterthwaite, D. (2008). Towards pro-poor adaptation to climate change in the urban centres of low- and middle-income countries, Vol. 3).

[122] ABB (2019). Decarbonization of mining: a realistic way forward. Available at. https://new.abb.com/mining/mineoptimize/systems-solutions/mining-electrification/decarbonization-of-mining-a-realistic-way-forward

disruptive changes in economic structure, with significant distributional consequences, not only between countries, but also within countries, including shifting of income and employment during the transition from high- to low-emissions activities[123]. Moreover, fossil fuel industries play an important role in the local tax revenue base; the decline of the industry may adversely affect public services such as education, transportation, and waste management. Furthermore, the social consequences of labour disruptions extend to other employment sectors within fossil fuel-based communities[124]. Employment and income shifts often affect vulnerable groups (e.g., older workers) and create unemployment, migration, mental disorders, weakening of social cohesion and often generate protests that sometimes even slow down the above-mentioned mitigation pathways[125]. Conversely, the development of new economic activities in the post mining era (that needs the support of public sector – e.g., by National and European Funds) "is required for implementing an action plan aiming at the diversification from existing economic activities depended on coal, gaining at the same time advantage by the specialisation of local workforce"[126].

Car-free mobility measures

Some among the measures listed above can be classified as car-free mobility measures (e.g., fuel tax, regulatory restrictions to encourage modal shifts, restriction on use of vehicles in certain areas/urban planning and zoning restrictions, enforcement of vehicle standards compatible with 0 emissions or very low emissions).

Car-free zones, while aiming for positive change, can disproportionately affect low-income individuals and those with disabilities who may rely on cars for transportation[127]. More specifically, in the frame of the already mentioned, ACCTING project, a specific research-line[128] on the implementation of such measures in marginalised urban areas in six European countries (Greece, Italy, Norway, Portugal Sweden, Romania) contributed to highlighting how such measures can generate forms of protest, even intense ones, by low-income citizens (that manifest, conversely a very low level of "loyalty" against them). These are people who are unable to replace their polluting cars with new ones,

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[123] IPCC (2023). Cit.
[124] Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. *Nature Energy*, *5*(8), 569-577.
[125] ENTRANCES (2022). D3.1 Silesia Region Case Study Report; D3.2 Lusatia Case Study Report; D3.5 Jiu Valley Region Case Study Report; D3.6 Sulcis Case Study Report. D3.7 Horná Nitra Case Study Report. ENTRANCES (ENergy TRANsitions from Coal and carbon: Effects on Societies) is an Horizon 2020 funded project implemented (also) by K&I. Available at: https://entrancesproject.eu/consortium/. Decarbonisation has been widely treated in social sciences in recent years. See: Rizzoli, V., Norton, L. S., & Sarrica, M. (2021). Mapping the meanings of decarbonisation: a systematic review of studies in the social sciences using lexicometric analysis. Cleaner Environmental Systems, 3, 100065. Available at: https://www.sciencedirect.com/science/article/pii/S266678942100057X
[126] Pavloudakis, F., Roumpos, C., Karlopoulos, E., Koukouzas, N., Sachanidis, C. G., & Pyrtses, S. (2019, October). Economic and social impact assessment of decarbonisation in Ptolemais lignite mining area. In *Proceedings of the 9th International Conference COAL* (pp. 195-208). Available at: https://www.researchgate.net/publication/336879234_ECONOMIC_AND_SOCIAL_IMPACT_ASSESSMENT_OF_DECARBONISATION_IN_PTOLEMAIS_LIGNITE_MINING_AREA
[127] The social equity impacts of UK congestion management strategies. Available at: https://appyway.com/blog/data-for-good/congestion-social-equity/#:~:text=Parallels%20exist%2C%20however%2C%20especially%20outside,in%20currently%20underserved%20urban%20areas.
[128] Cacace, M. & Pugliese F. (eds.) (2024). RL1 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is an Horizon 2020 funded project implemented (also) by K&I.

even used ones, that are able to meet the required high environmental standards. In cities where public services function poorly, such citizens are prevented or, at the very least, severely hampered in their mobility, considering, moreover, that often there are not even bike lanes and there could be significant differences in altitude, which makes the use of bicycles problematic even for people who are physically able to afford them. So, these car-free mobility measures resulted often as inadequate for the most vulnerable people and, moreover, their protests have delayed or severely limited their adoption.

Car-free mobility measures can have further unintended social consequences, including perceived loss of freedom, increased social inequalities, and potential for social exclusion, particularly for those who rely on cars or have limited access to alternatives[129]. However, these effects can affect not only vulnerable people but also those among them who live in peripherical areas.

Moreover, it should be reported that there are many very diverse measures that cities carry out in terms of mobility and urban sustainability, that do not receive subsequent evaluation and/or study to analyse their effectiveness or impact[130]. Indeed, potential negative effects of car free mobility measures on some disadvantaged people living in marginalised areas could be more extended than expected.

Remote work

Remote workers can have a 54% lower carbon footprint compared with onsite workers, with lifestyle choices and work arrangements playing an essential role in determining the environmental benefits of remote and hybrid work. Hybrid workers who work from home two to four days per week can reduce their carbon footprint by 11% to 29%. The main contributors to carbon footprint for onsite and hybrid workers are travel and office energy use[131]. This is connected to the digital marginalisation that persists worldwide and in European societies, and which is connected to geographical isolation and nationality, race, gender, religion and so on[132] (e.g., "*Young workers and those without university education are significantly less likely to work remotely*"[133]). However, it was also highlighted that teleworking can also facilitate social inclusion for people such as women, who, thanks to teleworking, can be able to take on greater responsibilities in caring for the family, and people with physical and mental

[129] Ryghaug, M., Subotički, I., Smeds, E., Von Wirth, T., Scherrer, A., Foulds, C., ... & Wentland, A. (2023). A Social Sciences and Humanities research agenda for transport and mobility in Europe: key themes and 100 research questions. *Transport reviews*, *43*(4), 755-779. Available at: https://www.tandfonline.com/doi/pdf/10.1080/01441647.2023.2167887%4010.1080/tfocoll.2022.0.issue-best-paper-moshe-givoni-prize

[130] Fernández-Aguilar, C., Brosed-Lázaro, M., & Carmona-Derqui, D. (2023). Effectiveness of mobility and urban sustainability measures in improving citizen health: A scoping review. *International Journal of Environmental Research and Public Health*, *20*(3), 2649. Available at: https://www.mdpi.com/1660-4601/20/3/2649

[131] Kacapyr, S. (2023). Lifestyle impacts green benefits of remote work. Cornell Chronicle website. Available at: https://news.cornell.edu/stories/2023/09/lifestyle-impacts-green-benefits-remote-work.

[132] Provenza, G. (2023). L'emarginazione sociale e digitale. Come le tecnologie digitali e Internet possono essere allo stesso tempo una minaccia e una risorsa per l'inclusione sociale dei giovani. Mondo internazionale website. Available at: https://mondointernazionale.org/focus-allegati/lemarginazione-sociale-e-digitale .

[133] Brussevich, M., Dabla-Norris, E., Khalid, S. (2020). Teleworking is Not Working for the Poor, the Young, and the Women. IMF blog. Available at: https://www.imf.org/en/Blogs/Articles/2020/07/07/blog-teleworking-is-not-working-for-the-poor-the-young-and-women .

disabilities[134]. Finally, it must also be considered that the poorest people have greater difficulty in having the tools necessary for teleworking, especially considering that rapid technological innovation makes frequent new expenses necessary (in addition to training updates) and that in some of the most basic professions, such as construction workers, agricultural labourers or street traders, teleworking has no relevance. So, teleworking, while it helps to decrease significantly gas emissions, is not pursued (mainly because it is not practicable) by many people who are vulnerable (while facilitating, conversely, the social inclusion of a number of people).

Low-emissions buildings

Adoption of building codes and standards[135], as well as the practice of energy audits involves the identification and implementation of energy efficiency measures and/or measures functional to the use of renewable energy sources (from light measures, such as replace old fluorescent and incandescent lighting with certified LEDs[136] or heat pump installation to structural measures, like energy efficiency roofing – e.g., metal roofs – and walls), which considerably improve the quality of buildings, but also considerably increase their cost. Then there are even more important measures such as vegetated roofs and walls are vital in controlling the building's carbon footprint and improving energy efficiency while promoting biodiversity[137] or to install photovoltaic systems.

These measures that contribute a lot to a better environmental sustainability can also exacerbate fuel poverty, increase costs for vulnerable populations, and potentially lead to complex or less user-friendly technologies, while also raising questions about the sustainability of the entire building lifecycle[138].

Indeed, these measures are (very) expensive and, even when there are very high incentives available, they are not always feasible for many people who live in disadvantaged conditions[139], who therefore, very often, are not able to do so and therefore continue to live in low energy efficiency houses and without access to

[134] Strizzolo, N. (2021). Il lavoro a distanza può essere inclusivo? Pro e contro. Agendadigitale website. Available at: https://www.agendadigitale.eu/cultura-digitale/il-lavoro-a-distanza-puo-essere-inclusivo-pro-e-contro/ .
[135] It should be highlighted that the adoption of building codes and standards is important for adaptation too as some standards increase the safety of buildings.
[136] https://www.energystar.gov/buildings/save-energy-commercial-buildings/ways-save/checklists.
[137] https://www.construction21.org/articles/h/green-roofs-and-walls-enhancing-energy-efficiency-and-biodiversity-in-commercial-buildings.html.
[138] Axon, S., & Morrissey, J. (2020). Just energy transitions? Social inequities, vulnerabilities and unintended consequences. *Buildings & Cities*, *1*(1).
[139] An example is the Superbonus 110% established in Italy. This is a tax relief, which consists of a 110% deduction of expenses incurred from 1 July 2020 to 31 December 2023 for the implementation of specific interventions aimed at energy efficiency and static consolidation or reduction of seismic risk of buildings. The subsidized interventions also include the installation of photovoltaic systems and infrastructure for charging electric vehicles in buildings; thermal insulation on building envelopes; and the replacement of heating systems. Since public finances actually cover 110% of the costs, it would seem accessible to everyone. In reality, however, all buildings where there is any construction abuse or any other type of anomaly that can date back to several decades before are excluded. This is a very common situation in Italy in houses built in past decades and almost all people living in disadvantaged conditions live there. One therefore has the impression that this incentive (which has squandered Italian public finances) has benefited above all construction companies and people who lived in modern or relatively modern houses that have been made eco-sustainable, increasing their value (see https://www.fanpage.it/politica/quanto-ha-speso-lo-stato-per-il-superbonus-110-e-chi-ci-ha-guadagnato-davvero/)

renewable energy[140]. Consequently, their energy bill is higher, generating further situations of energy poverty.

In a few words, the transition to low-emission buildings might leave groups already vulnerable to fuel poverty behind, in particular if the costs and complexities of the technology are not addressed[141]. Last but not least, buildings[142] that are renovated (and where, on the basis of yield, much lower energy bills are spent) increase greatly in value and become even more inaccessible, except for wealthy people.

Sustainable small and micro enterprises

About the policies and measures designed to improve energy efficiency and popularise options for renewable energy in small and micro enterprises, we have, in fact, already spoken about in the first paragraph of this section. It has been already highlighted that when the implementation of such measures is not mandatory, among those who do not even take them into consideration, there are micro-entrepreneurs in socio-economic difficulty[143], sometimes elderly, sometimes migrants.

Most among them are "ignorant companies"[144] having no special focus on energy-related/environmental issues and generally lacking devoted staff working on these issues. Even among the remaining ones, the problems are many, looking at, among other things, the barriers and drivers that SMEs encounter [145]. In general, it seems that "there is no dedicated research on barriers to energy transition and in particular energy efficiency measures in micro-enterprises[146]".

Some vulnerable micro-entrepreneurs show environmental awareness and have ideas about what they could do to improve their energy efficiency but are hindered by bureaucratic hurdles and a lack of financial resources. Some also meet some resistance within their business and from their clients, as the adoption of environmental practices can increase the prices of goods or

[140] At this regard, the European Environment Agency emphasises that low-income households are less able to invest in protective measures and are more vulnerable to the impacts of climate change, such as increased energy costs due to the transition to renewable energy sources. See Environmental inequalities (2024). Available at: https://www.eea.europa.eu/en/topics/in-depth/environmental-inequalities
[141] SFPAP (2024). The unintended consequences of decarbonisation technologies for fuel poverty outcomes: a systematic review of issues and mitigations. Available at: https://fuelpovertypanel.scot/wp-content/uploads/2024/04/Commissioned-Research-Final-with-Cover-Page.pdf
[142] It should be highlighted that the adoption of building codes and standards (considering further codes and standards) is important for adaptation too. Indeed, the adoption of some standards increase the safety of buildings (for example, requiring homes to be elevated in flood areas).
[143] INNOVEAS (2023). Deliverable 2.2. Available at: https://innoveas.eu/wp-content/uploads/2020/04/INNOVEAS_WP2_State-of-the-art-needs-and-barriers-assessmentD2.2-Assessment-of-non-technical-barriers.pdf
[144] Palm, J. (2009). Placing barriers to industrial energy efficiency in a social context: a discussion of lifestyle categorisation. *Energy Efficiency*, 2(3), 263–270. Available at: http://dx.doi.org/10.1007/s12053-009-9042-1
[145]Johansson, M.T., Thollander, P. (2018). A review of barriers to and driving forces for improved energy efficiency in Swedish industry–recommendations for successful in-house energy management. *Renewable and Sustainable Energy Reviews, 82*, 618–628. https://doi.org/10.1016/j.rser.2017.09.052 ; Nulkar, G. (2014). SMEs and environmental performance–A framework for green business strategies. *Procedia-Social and Behavioral Sciences*, 133, 130-140. Available at: https://pdf.sciencedirectassets.com/277811/1-s2.0-S1877042814X00297/1-s2.0-S1877042814030870/main.pdf; Sorrell, S., Mallett, A., & Nye, S. (2011). Barriers to industrial energy efficiency: A literature review. UNIDO. www.sciencedirect.com/science/article/abs/pii/S0928765516302846.
[146] Rogulj I. (2024). Discussion paper: What determinants of microenterprises influence their energy vulnerability? IEECP. Available at: https://ieecp.org/wp-content/uploads/2024/06/Discussion-paper-on-microenterprises_Rogulj.pdf

services[147]. As has been said, all this cannot be generalised, but nevertheless sufficient to question the compatibility of such policies with people who live and work in disadvantaged. So, as already stated above, the more entrepreneurs are in a distressed condition, the less "virtuous" they can be.

Low-emission livestock

Low-emission livestock breeding and management practices focus on reducing greenhouse gas emissions from animal agriculture, particularly methane and nitrous oxide, through improved feed efficiency, manure management, and genetic selection. In this respect:

> *"There is growing concern that increased livestock production - a result of trying to cover the higher demand for milk and meat in developing countries - will further increase emissions of greenhouse gases... More than 500 million livestock farmers in tropical countries would have to make cuts."*[148]

> *"Livestock contributes to climate change by emitting GHG, either directly from enteric fermentation or indirectly through, for example, feed-production activities, deforestation and manure. Greenhouse gas emissions can arise from all the main steps of the livestock production cycle... Direct reduction of GHG emissions through breeding (...) is a valid mitigation strategy."*[149]

However, unintended consequences can arise, including potential impacts on animal welfare, changes in land use, and shifts in the food supply chain. Each low-emission transition pathway has a unique footprint of positive and negative impacts[150].

Nore specifically, these are not strategies that are easily implementable or particularly widespread among poor breeders at present, so much so that efforts are being made to define and implement actions functional to this within the "Pro-poor animal breeding addresses, as part of overall improvement, the breeding programme design and implementation issues that are relevant for poor smallholder livestock keepers or pastoralists"[151] It would therefore appear that similar problems to those mentioned in the previous points are encountered with regard to climate change mitigation policies relating to livestock farming.

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[147] This is what emerges, among other results, from a research carried out in 2023 among vulnerable micro-entrepreneurs in Belgium, Greece, Italy, Norway and Romania within the framework of the ACCTING project. Zorell, C., & Strid, S. (eds.) (2023). D3.2 ACCTING Report on first cycle experimental studies. Confidential report delivered to the European Commission 28 April 2023. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I. https://accting.eu/project-deliverables/

[148] EU (2023). Climate change? Blame it on production practices, not just cows. CORDIS article. Available at: https://cordis.europa.eu/article/id/32504-climate-change-blame-it-on-production-practices-not-just-cows

[149] Cassandro, M. (2020). Animal breeding and climate change, mitigation and adaptation. *Journal of Animal Breeding & Genetics*, 137(2). Available at: https://onlinelibrary.wiley.com/doi/full/10.1111/jbg.12469

[150] Spijker, E., Anger-Kraavi, A., Pollitt, H., & van de Ven, D. J. (2020). Evaluating integrated impacts of low-emission transitions in the livestock sector. *Environmental Innovation and Societal Transitions*, 35, 482-492. Available at: https://www.sciencedirect.com/science/article/pii/S2210422419302801

[151] Rege, J. E. O., Marshall, K., Notenbaert, A., Ojango, J. M., & Okeyo, A. M. (2011). Pro-poor animal improvement and breeding—What can science do?. *Livestock science*, 136(1), 15-28. Available at: https://www.sciencedirect.com/science/article/abs/pii/S1871141310004774

2.3. Limitations and Uncertainties

The analysis of climate change adaptation and mitigation measures and policies could continue and could lead us to identify further inadequacies of such policies/measures in their capacity to be adopted also by vulnerable people. However, we think that examples above are enough and we will limit ourselves to remember that there are a lot of further policies that does not affect (at least directly) vulnerable people (e.g., improving energy efficiency and opting for renewable energy in large enterprises, emission credits, carbon tax), which are of tremendous significance for climate change mitigation and remember that, in any case, the main emissions contributors, even today, are the large economic actors and the most wealthy human groups and certainly not the most vulnerable people.

That said, in the previous two paragraphs, we have highlighted meaningful limitations:

- Of some adaptation policies in safeguarding the most vulnerable people from the effects of climate change, pointing out, indeed, their possible anti-perequative effects in the sense that, just the opposite, such policies protect much more those who are better off; and much less or not at all those who are worse off
- Of some mitigation policies, which, as they are often currently conceived, are not relevant to many vulnerable individuals who, therefore, remain excluded from these policies which leads these people, in multiple situations, even to oppose them.

As it was well-stated by the United Nations:

> *"Just as the effects of climate change are distributed unevenly, so too are the policies designed to counter them"*[152].

3. Climate policies towards equity and social inclusion - social and climate justice

In the previous section, we highlighted the problematic nature of some climate policies towards disadvantaged people. These are policies, therefore, which may have negative effects on equity and increase inequality and vulnerability. We should emphasise "may" because, as has been pointed out several times, this is not always the case and we have also already pointed out measures that are taken to counteract some of the negative social effects of such policies.

In this section, again on the basis of the review carried out, we will first present some examples of climate policies/measures that, with certain caveats, are functional for the promotion of equity and social inclusion of disadvantaged persons, as well as we will go into more detail on measures taken to counteract the negative social effects of climate policies. Finally, we will elaborate on some

[152] UNDESA (2020). World Social Report 2020. Available at: https://www.un.org/en/desa/world-social-report-2020

notions related to the concepts of social justice in relation to climate justice and just transition.

3.1. Climate policies towards equity and social inclusion

First of all, it has to be recalled what was written in Section 1 of this section: climate change exacerbates economic and social inequality and, therefore, any climate policy, irrespective of its possible unintended negative social effects, should ultimately mitigate this exacerbation.

> *"The benefits of shifting to a less carbon-intensive socio-technical regime include more resilient and democratic energy systems, industrial restructuring and technological advancements, poverty alleviation, and addressing social and environmental justice concerns within and across nations."*[153]

Going now to identify some examples of climate policies/measures that, with certain caveats, are functional for the promotion of equity and social inclusion of disadvantaged persons, on the adaptation side, mention has already been made of the ongoing attempts to make EWSs systems accessible to all and, as far as possible, adopting a bidirectional perspective (i.e., also valuing information that comes from below); and of examples of vulnerable communities living in flooded areas successfully relocated to safer housing.

Many experiences of Community-based (disaster) risk management can be also reported.

> *"Community Based Disaster Risk Management (CBDRM) is a process in which at-risk communities are actively engaged in the identification, analysis, planning, implementation, monitoring and evaluation of disaster risk reduction interventions. This means that people are at the heart of decision-making of disaster risk management (DRM) activities, take responsibility and are accountable at all stages from risk assessment to implementation... The two key players are the local government and civil society and/or nongovernment organizations. Another feature of CBDRM is that it focuses more on pre-disaster interventions - prevention, mitigation, and preparedness – and go beyond community response mechanisms. The aim of CBDRM is to strengthen peoples' capacity to cope with the disaster risks they face."*[154]

CBDRM is often explicitly, tailored on vulnerable actors, adopting also an intersectional approach, both because it is often promoted in disadvantaged communities[155] and because it involves specific actions functional to gender empowerment (capacity building and inclusion in governance mechanisms[156]); to tailor disaster-risk management to the specific categories of vulnerable

[153] Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research & Social Science*, 82, 102291. Available at: https://warwick.ac.uk/fac/arts/schoolforcross-facultystudies/igsd/allsts/school25/programme/wang_and_lo_2021_just_transitions_review.pdf
[154] CADRI Partnership under the leadership of UNDP with inputs from GNDR, IFRC and UNFPA (2020). Compendium of Good Practices on Community Based Disaster Risk Management. Available at: https://www.cadri.net/system/files/2021-09/CADRI%20-%20Good%20Practices%20-%20CBDRM_2020.pdf
[155] APFM (2008). Organizing Community Participation for Flood Management. Available at: https://www.floodmanagement.info/publications/tools/Tool_04_Organizing_Community_Participation_for_FM.pdf ; APFM (2017). Community-Based Flood Management. Available at: https://www.floodmanagement.info/publications/tools/APFM_Tool_4_e.pdf
[156] Mezzana D., Quinti G. (2024). Voices from the field. Volta Flood and Drought Management Program. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/02/Voices-from-the-field_VFDM-26-06-2024.pdf.

people, according to their specific needs[157] and the inclusion and valorisation of disadvantaged people (e.g., Vulnerable Household Mapping and workshops on "Risk Management from a Gender and Inclusion Perspective"; valorisation of elderly local knowledge on disasters[158]).

Beside these community approaches, climate services play a crucial role in enhancing education by promoting capacity building, fostering climate literacy, and providing access to information, ultimately empowering individuals and communities to address climate change effectively[159]. Indeed, the United Nations strongly advocates for climate policies that actively consider gender equality and inclusivity, meaning they prioritise the needs and voices of individuals most vulnerable to the impacts of climate change, particularly women and marginalised communities; this includes ensuring equitable access to climate finance, promoting their participation in decision-making processes, and integrating considerations of equity into national adaptation plans, early warning systems, and climate risk governance strategies[160].

We can also mention cases of multiple transformations in agriculture involving vulnerable farmers (e.g., in Tanore sub-district of Rajshahi district, Bangladesh).

> *"Increased temperature, lack of water availability, change in rainfall pattern, and limited availability of drought-resilient crop seeds increased farmers' vulnerability to drought. Farmers were shifting from traditional farming practices to more ecosystem-based, integrated farming practices that are less climate-sensitive. Combined agriculture, selecting drought-tolerant rice varieties, and shifting cropping patterns were some strategies that farmers adopted to address risks."*[161]

Finally, we can refer to the set-up of protected areas (functional not only to adaptation but also to mitigation) looking at places and cases where active people (groups, families, and individuals in vulnerable settings) come together and collectively engage in caretaking for nature. Often, people in vulnerable conditions are among the leaders in promoting and safeguarding these protected areas (e.g., Opposing the development of a quarry in a UNESCO site in Gornoslav, Bulgaria; biodiversity conservation through active citizens' participation in environmental monitoring in Sintra Cascais Natural Park in Portugal or in Bucovina, Romania)[162].

On the mitigation side, mention has to be made on the slow but constant spread of energy and solidarity communities (at least in many European

[157] WMO (2024). Mainstreaming Gender into End-to-End Flood Forecasting and Early Warning Systems and Integrated Flood Management. Associated Program on Flood Management. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/01/GenderManual-VB.pdf
[158] VFDM (2022). Manual on Community-based Floods and Drought Management in the Volta Basin. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2022/10/Manual-CBFDM-VB_FinalVersion.pdf
[159] IPCC (2023). Cit.
[160] UNFCCC (2023). Progress, good practices and lessons learned in prioritizing and incorporating gender-responsive adaptation action. Available at: https://unfccc.int/sites/default/files/resource/202310_adaptation_gender.pdf
[161] Sultana, R., Irfanullah, H. M., Selim, S. A., & Budrudzaman, M. (2023). Vulnerability and ecosystem-based adaptation in the farming communities of droughtprone Northwest Bangladesh. *Environmental Challenges*, 11, 100707. Available at: https://www.sciencedirect.com/science/article/pii/S266701002300029X
[162] Martin Felix Gajdusek et al. (2025). Experimental Studies, Second Research Cycle: Research Line 2 Report. Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is an Horizon 2020 funded project

countries), widespread energy model, based on self-production and self-consumption of energy from renewable sources, electrical and thermal, which is integrated with the largest clean technology plants, capable of contributing to reducing the geopolitical weight of fossil fuels and, at the same time, to fighting against energy poverty[163] with the active and often free (solidarity) involvement of poor people and people with other vulnerability profiles (e.g., physically and mentally handicapped). Environmental and economic goals are integrated with social goals and energy communities, initially conceived as a tool for promoting the widespread of renewable energy sources and the energy citizens' ownership, become a "tool" for social inclusion of disadvantaged people and communities' social cohesion[164].

Further mention is on projects have been underway for some years to encourage poor farmers to adopt better environmental practices that involve technologically simple steps in livestock management; and from which they could potentially earn US$ 1.3 billion (about EUR 1 million) per year by selling the carbon saved on global markets[165]. Finally, we can mention the numerous forms of assistance and support to "vulnerable" micro-entrepreneurs to facilitate the adoption of energy efficiency measures and the greater use of renewable energy sources; promoted both by large enterprises and by associations, even informal ones, between entrepreneurs and by non-profit voluntary organisations[166].

Perhaps even more important are the 'just transition' measures that have been (and are being) designed and implemented to alleviate the undesirable social effects of the 'decarbonisation of industry' mitigation policy. According to the United Nations, just transition means: "greening the economy in a way that is as fair and inclusive as possible for all concerned, creating decent work opportunities and leaving no one behind" [167].

> *"A just transition means promoting environmentally sustainable economies in a way that is inclusive and gender-responsive, by creating decent work, by reducing inequalities and by leaving no one behind. A just transition is also an opportunity to recognize the value of care work and to invest in public care infrastructure and services as part of just transition processes, thereby advancing gender equality in the world of work."*[168]

The background was the strengthening of environmental governance in the 1970s negatively impacted employment in the industries that struggled to

[163] Legambiente (2021). Nasce la Rete delle Comunità Energetiche Rinnovabili e Solidali. Available at: https://www.legambiente.it/comunicati-stampa/nasce-la-rete-delle-comunita-energetiche-rinnovabili-e-solidali/
[164] Quinti G. (eds.) (2024). RL3 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is an Horizon 2020 funded project implemented (also) by K&I.
[165] EU (2023). Climate change? Blame it on production practices, not just cows. CORDIS article. Available at: https://cordis.europa.eu/article/id/32504-climate-change-blame-it-on-production-practices-not-just-cows
[166] Zorell, C., & Strid, S. (eds.) (2023). Cit.
[167] UNDP (2022). What is just transition? And why is it important? Available at: https://climatepromise.undp.org/news-and-stories/what-just-transition-and-why-it-important
[168] ILO (2019). Gender, equality and inclusion for a just transition in climate action. Available at: https://www.ilo.org/publications/gender-equality-and-inclusion-just-transition-climate-action#:~:text=Climate%20change%20has%20far%2Dreaching,and%20inclusion%2C%20and%20decent%20work

adapt due to their failure to meet environmental standards[169]. Then, labour unions diffused just transition principles internationally by participating in global environmental negotiations starting in the early 1990s and this concept is becoming increasingly establish-mentioned in various documents from international organisations and the European Commission, which, among others, also established the Just Transition Fund (JTF)[170]. JTF provides support to EU Member States that have identified the territorial areas (e.g., the mining areas) that are likely to be most negatively affected by the transition to climate neutrality (needed in relation to European policies aimed at reducing emissions in order to mitigate climate change[171]), and therefore supports the economic diversification and conversion of the affected areas, as well as the recovery of regions that might otherwise suffer and be left behind in a net-zero economic Europe (among other, the JTF supported the up- and reskilling of workers and job-search assistance for people who lose their jobs in connection with industrial conversion[172]). However, some criticism has also been voiced in this respect. If we look at the one we have been focusing on most, the European JTF, for example, it's been argued that sufficient funding is lacking[173] or that there is a risk that some disadvantaged areas will be excluded from it[174]. Other critics argue that the establishment of just transition funds will inadvertently lead to the indefinite subsidisation of the fossil fuel industry[175]. Finally, it has been highlighted that the JTF appears to favour male-dominated sectors and neglect those where women are disproportionately represented, often characterised by low wages and job insecurity. This trend therefore risks reinforcing existing gender segregation and other inequalities within these sectors and the wider labour market[176].

European Commission established also the Social Climate Fund, aiming to contribute to a socially fair transition towards climate neutrality by addressing the social impacts of the inclusion of greenhouse gas emissions from buildings and road transport. To this end, the Fund aims at mitigating the adverse impact of the climate transition on vulnerable groups[177] (however, Social Climate measures will be implemented only from 2026).

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[169] Stevis, D., & Felli, R. (2020). Planetary just transition? How inclusive and how just? *Earth System Governance* 6: 100065. Available at: https://www.sciencedirect.com/science/article/pii/S2589811620300240

[170] The Just Transition Fund has been established in the broader frame of the Just Transition Mechanism (related to the European Green Deal) that includes, beyond the Just Transition Fund, also the InvestEU "Just Transition" scheme and a public-loan facility. See: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en.

[171] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan_en

[172] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism/just-transition-funding-sources_en

[173] Pianta, M., & Lucchese, M. (2020). Rethinking the European Green Deal: An industrial policy for a just transition in Europe. *Review of Radical Political Economics*, 52(4), 633-641.

[174] Sarkki, S., Ludvig, A., Nijnik, M., & Kopiy, S. (2022). Embracing policy paradoxes: EU's Just Transition Fund and the aim "to leave no one behind". *International Environmental Agreements: Politics, Law and Economics*, 22(4), 761-792. Available at: https://link.springer.com/article/10.1007/s10784-022-09584-5

[175] Heffron, R. J., & McCauley, D. (2022). The 'just transition' threat to our Energy and Climate 2030 targets. *Energy Policy*, 165, 112949.

[176] Allwood, G. (2020). Mainstreaming gender and climate change to achieve a just transition to a climate-neutral Europe. *J. Common Mkt. Stud.*, 58, 173. Available at: https://onlinelibrary.wiley.com/doi/10.1111/jcms.13082

[177] https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/social-climate-fund_en#:~:text=About%20the%20Social%20Climate%20Fund%20(SCF),-The%20SCF%20was&text=It%20will%20provide%20EU%20Member,behind%20during%20the%20green%20transition.

3.2. Climate (environmental) justice and social justice

The just transition approach seems as appropriate to get out of the situation of uncertainty and oscillation that we have tried to outline in the previous pages. Indeed, IPCC states[178] with high confidence, as demonstrated by some studies[179] that prioritising equity, climate (environmental) justice, social justice, inclusion and just transition processes can enable adaptation and ambitious mitigation actions and climate resilient development.

However, from what has been outlined so far, it would seem that this approach is far from general in the design and implementation of policies relating to mitigation and adaptation (as it has been shown in Section 2 where multiple social limitations of policies related to adaptation and mitigation have been highlighted).

There are several concepts that underlie this approach.

There are people[180], who consider a socially just transition as a combination of climate justice and social justice perspectives, ensuring that the shift to a sustainable and low-carbon economy benefits everyone, not just some, by addressing potential negative impacts on vulnerable communities and workers, possible following to a path similar to the one drawn in the previous pages, including an intersectional approach.

> *"To consider social justice in the context of climate policy, it is key to acknowledge the large variety of inequalities along different dimensions and impact categories, including intersectionality and trade-offs."*[181]

In this same perspective, scholars attempt to transcend the historical meaning of a just transition described above by recognising the linkage between the concept with other, more established concepts in the justice-related literature, including environmental, climate, and energy justice (i.e., just transition as an integrated framework for justice)[182]. Still others suggest a more practical focus from the perspective of legal geography; one that emphasises taking legal action to reduce inequality and injustice during the period of energy transition.[183] Indeed, the concept of just transition, which draws attention to the equity and justice issues associated with efforts to address energy and climate problems, is increasingly recognised.

According to the Environmental Law Foundation:

> *"Environmental justice and social justice are distinct yet intrinsically connected realms. They intersect when the brunt of environmental issues is borne*

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[178] IPCC (2023). Cit.
[179] See: Brown, K., & Siri, E. (2012). *Sustainable adaptation to climate change: prioritising social equity and environmental integrity*. Routledge; Fortmann, L. (2010). The Social Dimensions of Climate Change. Equity and Vulnerability in a Warming World. By R. Mearns, A. Norton and E. Cameron. Washington DC: The World Bank (2010), pp. 232. ISBN 978-0-8213-7887-8. *Experimental Agriculture*, *46*(3), 422-422.
[180] Stevis, D., & Felli, S. (2016). Green transitions, just transitions? *Kurswechsel*, 3, 35–45
[181] Liao, Weijun, Ying Fan, and Chunan Wang. "Exploring the equity in allocating carbon offsetting responsibility for international aviation." *Transportation Research Part D: Transport and Environment* 114 (2023): 103566.
[182] Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research & Social Science*, 82, 102291. Available at: https://warwick.ac.uk/fac/arts/schoolforcross-facultystudies/igsd/allsts/school25/programme/wang_and_lo_2021_just_transitions_review.pdf
[183] R.J. Heffron (2020). The role of justice in developing critical minerals. *The Extractive Industries and Society*, 7 (3) (2020) 855–863.

disproportionately by marginalized and socially disadvantaged groups. At the core of the connection between environmental and social justice is the fact that the environment we live in greatly impacts our quality of life. Clean air, potable water, and access to green spaces, for example, are essential components of healthy living."[184]

Some further theoretical and operational approaches to climate (environmental) justice already includes these social concerns. So, climate justice includes social justice. According to UNICEF, for example:

"Climate justice connects the climate crisis to social, racial, and environmental issues, recognizing the disproportionate impacts of climate change on low-income people… It acknowledges that not everyone has contributed equally to climate change and aims to combat social, gender, economic, intergenerational, and environmental injustices (…) This entails ensuring representation, inclusion, and protection of the rights of those most vulnerable to the effects of climate change. Solutions must promote equity, assure access to basic resources."[185]

While, along the same line of thought, the Environmental Protection Agency defines environmental justice as:

"The fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."[186]

This definition is historically grounded in the environmental justice movement, which has a long history of being at the forefront of fighting for vulnerable groups that are disproportionately impacted by environmental degradation[187].

Conversely, according to other scholars, environmental justice is a specific aspect of social justice that focuses on the fair distribution of environmental benefits and burdens, ensuring everyone has access to a healthy environment and meaningful participation in environmental decision-making[188].

So, there is not much clarity on the concepts of social justice and climate justice and their respective interconnections.

"Climate justice has become prominent in academia, policy circles, and among climate activists, but the notion of justice is highly subjective, and climate justice is often invoked without a clear definition of the concept. To achieve climate

[184] Environmental Law Foundation (2024). The Interwoven Paths of Environmental and Social Justice. Available at: https://elflaw.org/news/the-interwoven-paths-of-environmental-and-social-justice/#:~:text=Environmental%20justice%20and%20social%20justice,essential%20components%20of%20healthy%20living.

[185] UNICEFF (2022). What is Climate Justice? And what can we do achieve it? Available at: https://www.unicef.org/innocenti/stories/what-climate-justice-and-what-can-we-do-achieve-it

[186] Environmental Protection Agency (2013). Environmental Justice-Related Terms As Defined Across the PSC Agencies. Available at: https://www.epa.gov/sites/default/files/2015-02/documents/team-ej-lexicon.pdf

[187] Farrell, C. (2012). A just transition: Lessons learned from the environmental justice movement. *Duke FL & Soc. Change*, 4, 45.

[188] Crump, B. (2025). What Is the Difference Between Environmental and Social Justice? Available at: https://bencrump.com/environmental-justice-lawyer/what-is-the-difference-between-environmental-and-social-justice/#:~:text=The%20difference%20between%20environmental%20and%20social%20justice%20is%20that%20environmental,Resources%20Defense%20Council%20(NRDC).

justice, it is necessary to clarify what it means in specific contexts (...) Climate justice is social justice in the Global South."[189]

And the same can be said (obviously, we might add) about the notion of just transition.

"There is no universally agreed-upon definition of or framework for just transitions."[190]

"The concept of just transition has become, in our view, so ambiguous and with so many different meanings that communication and debate have become difficult."[191]

Besides, it should be noted that in this brief review we have made a considerable simplification by assimilating the various concepts of environmental justice and climate justice, which have at least partly different origins (moreover, the notion of energy justice should also be added to these concepts).

On top of that, UN Women (2023) developed a comprehensive framework for feminist climate justice that can be achieved through four interlinked dimensions (recognition, redistribution, representation, and reparation) and the principles of interdependence and intersectionality. It emphasises the need to integrate gender equality, social justice, and environmental sustainability into all aspects of climate policy and action. The framework provides practical guidance on what countries need to do to transition to low-emission economies that are resilient to a changing climate, while recognising the leadership of women, girls, and gender-diverse people in driving the change[192].

Further citations could be added relating to the concepts of social justice, climate justice (and their interactions), environmental justice, just transition and so on (e.g., further related concepts, such as the one of distributional justice)[193].

As highlighted by Heyen: "Several streams of research have discussed important aspects of social inequalities and justice in the context of climate, energy, and environmental issues"[194].

What has been said, however, appears sufficient to highlight that:

a. there is still a certain conceptual or even terminological disorder on the subject (just remember the "contrast" just mentioned between those who support the inclusion of social justice in climate justice and those who instead speak of them as two distinct scopes to be combined)
b. there is, nevertheless, among some representatives, both of the scientific community and of the "operating" community (e.g., international organisations) a certain sensitivity to effectively introduce the issues

[189] Ogunbode, C. A. (2022). Climate justice is social justice in the Global South. *Nature Human Behaviour*, *6*(11), 1443-1443.
Henry, M. S., Bazilian, M. D., & Markuson, C. (2020). Just transitions: Histories and futures in a post-COVID world. *Energy Research & Social Science*, *68*, 101668.
[191] Wang, X., & Lo, K. (2021). Cit.
[192] UN Women. (2023). Feminist climate justice: Policy brief. Available at: https://www.unwomen.org/en/digital-library/publications/2023/07/feminist-climate-justice
[193] Lamont, J. (Ed.). (2017). *Distributive justice*. Routledge.
[194] Heyen, D. A. (2023). Social justice in the context of climate policy: systematizing the variety of inequality dimensions, social impacts, and justice principles. *Climate Policy*, 23(5), 539-554.

connected to social justice in the context of the design and implementation of policies connected to climate change

c. however, on the one hand, such awareness is still limited and, on the other, combining everything is very complex and there do not seem to be any already elaborated and validated schemes on how one could proceed; and finally the empirical situations to which one must refer are very differentiated; so, it is not surprising to find, up to now, limited effect on the climate change mitigation and adaptation policies; this occurs in practice only sometimes and often without enough effectiveness (as saw Section 6 and Section 7).

So, according to the UNESCO Courier "There is a tendency in the public debate on climate change to present the use and development of green technologies as a miracle solution or panacea. We often forget one aspect: it is crucial to ensure that their development goes hand in hand with social justice (...) Without equality and equity – in other words, without peace and security – we cannot effectively fight climate change"[195].

4. Disadvantaged people as agents of the climate transition

Before concluding this review, it is also worth noting that vulnerable people are not only beneficiaries (and sometimes "victims", as highlighted in Section 2) of the climate policies. They are among the protagonists of many climate actions (a few examples in Section 3).

Broadly some disadvantaged people do actually play an active role in relation to climate change.

> *"Vulnerable social groups and communities tend to be more exposed to the diversified and often cumulating risks of being damaged by climate change and the norms targeting it. Yet also, they can be – and they often actually are – among the key actors for managing the climate transition and enact change, particularly when they form groups and networks to collectively address the issues they face."*[196]

Beyond actions in specific contexts, this is also connected to specific characteristics of each category of disadvantaged individuals who, beyond their vulnerability, make them resources.

Women – including those living in vulnerable conditions – are more sensitive to natural and human risks because they are more aware of the social, microeconomic and environmental aspects of everyday life that affect them and their families, and because they are more likely than men to pay attention to emergency warnings and to be more safety-conscious[197]. As they usually have the primary responsibility for caring for a home and the people in it, women are

[195] The UNESCO Courier (2019). Climate and social justice. Available at: https://courier.unesco.org/en/articles/climate-and-social-justice.
[196] Schor, J. B., & Thompson, C. J. (2014). *Sustainable Lifestyles and the Quest for Plenitude.* Case Studies of the New Economy. New Haven: Yale University Press
[197] Associated Program on Flood Management (2024). Mainstreaming Gender into End-to-End Flood Forecasting and Early Warning Systems and Integrated Flood Management.

often the first responders in disasters, rescuing children, elderly, persons with disabilities, and other community members, and informing local authorities and emergency teams. Indeed, women are often at the forefront of climate adaptation, managing resources, supporting families, and advocating for their communities' needs in the face of climate change. They have been leading global and national climate movements that have put a spotlight on the urgency of the climate crisis and the need for action for the sake of this and future generations[198]. At the political level, research shows clear linkages between women's leadership and action to tackle climate change. For example, studies have found that countries with higher proportions of women in parliament are more likely to ratify international environmental treaties and have stricter climate policies[199].

Older people have knowledge that should not be wasted (e.g., historical memory of past disasters in the area where they live) but, on the contrary, should be used to improve preparedness for future hazards. For example, in the Vajont disaster case, the local older population knew full well that the area where the dam was built was prone to landslides: the mountain proven to be the source of the landslide was called 'Toc' (onomatopoeic for the sound of a rock falling), which means rotten in the local dialect[200]. Despite this element (and the fact that scientific studies of the site's geology confirmed what the inhabitants had known for generations), no attention was paid to that knowledge and work proceeded with the development of the project called 'Grande Vajont', followed by the disaster on 9th October 1963[201].

Children are often among the best-educated members of a community and more aware of the risks, having benefited from educational programmes at school. They are often an effective means of transmitting relevant information to their families and, broadly, in their communities[202]. Furthermore, young people with education can often be agents of change, entrepreneurs and innovators, and their skills can accelerate climate action[203].

Indigenous peoples and other communities with traditional ecological knowledge possess valuable insights into sustainable resource management and climate-resilient practices that can be crucial for both mitigation and adaptation efforts. They often have deep understanding of ecosystems,

[198] UN (n.d.). Why women are key to climate action. UN website. Available at: https://www.un.org/en/climatechange/science/climate-issues/women#:~:text=Particularly%20in%20rural%20areas%2C%20women,its%20impacts%20on%20the%20ground.
[199] Norgaard, K., & York, R. (2005). Gender equality and state environmentalism. *Gender & Society*, 19(4), 506-522.
[200] Aria (2010). Déferlement de 50 millions de m3 d'eau au barrage du Vajont, fiche N° 23607, Ministère du développement durable (French Ministry of Sustainable Development) – DGPR/SRT/BARPI, France. www.aria.developpement-durable.gouv.fr/wp-content/files_mf/FD_23607_Vajont_Italie_1963_.pdf
[201] Quinti, G., & Guaschino, E. (2016). Public Perception of Flood Risk and Social Impact Assessment. Available at: https://www.floodmanagement.info/publications/tools/Tool_25_Public_Perception_of_Flood_Risk_and_Social_Impact_Assessment.pdf
[202] Rodríguez, A. I., Grígolo, M. A., Tejada, F. E., Albarracín, A., Martinez, M. P., Sales, R. G., & Naranjo, R. (2025). Strategies for teaching natural hazards to children in rural communities. *International Journal of Disaster Risk Reduction*, 116, 105033.
[203] UN (n.d.). Youth in action. UN website. Available at: https://www.un.org/en/climatechange/youth-in-action

traditional farming techniques, and climate-resilient practices that can be adapted to contemporary challenges[204].

Indigenous women have been at the forefront of environmental conservation. They bring invaluable ancestral knowledge and practices that build resilience in a changing climate, for example, by preserving crop biodiversity and seed varieties, protecting pollinators and local bee populations, using natural soil building and fertilisation methods, or leaving forests intact[205].

Indeed, disadvantaged people can be powerful agents of climate transition, playing key roles in both addressing the causes and effects of climate change, and in promoting a just transition that leaves no one behind, by advocating for their rights and needs, demanding just transition policies, and participating in climate action initiatives. Their unique experiences and perspectives, often on the frontlines of climate impacts, make them valuable contributors to developing effective and equitable solutions, informing the development of effective strategies for building resilience at the local level[206]. Disadvantaged communities can organise and implement local climate adaptation projects, such as water conservation programs, community gardens, and renewable energy initiatives[207], as well as be at the heart of CBDRM (see Section 3).

Disadvantaged people do actually play a quite different active role in relation to climate change, as a reaction to the negative impacts of some climate policies we mentioned above (see Section 2). These are sometimes active resistances (e.g., protests against the policies for the decarbonisation of industry, car-free mobility, or low-emission livestock measures), or more often passive resistances (e.g., apathy/non-participation in policies aiming at moving out from flooded areas or stopping deforestation). Active resistance often hinders, or even prevents, the implementation of such policies, while both active and passive resistance limit their effectiveness anyway.

Scholars have identified a rich repertoire of resistance, ranging from hesitation, avoidance, foot-dragging to strikes, demonstrations and noncompliance[208]. What they highlight:

> *"is that it is essential to recognise resistance as a legitimate, complex response to work with, rather than as a hurdle to overcome. By acknowledging and working with resistance, policymakers can uncover gaps in inclusivity, barriers to access*

[204] ILO (2022). Indigenous Peoples and a Just Transition for All. Just Transition Policy Brief. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/@emp_ent/documents/publication/wcms_860607.pdf
[205] UN (n.d.). Why women are key to climate action. UN website. Available at: https://www.un.org/en/climatechange/science/climate-issues/women#:~:text=Particularly%20in%20rural%20areas%2C%20women,its%20impacts%20on%20the%20ground
[206] Climate Impacts Group University of Washington - Climate Inequality. See: https://cig.uw.edu/learn/inequities-in-climate-impacts/#:~:text=Frontline%20communities%20are%20often%20hit,disproportionately%20exposed%20to%20climate%20risks.
[207] Pasricha, N., Baur-Yazbeck, S. (2020). How Financial Services Can Help the Poor in the Climate Transition- CGAP. Available at: https://www.cgap.org/blog/how-financial-services-can-help-poor-in-climate-transition#:~:text=Innovations%20in%20PAYGO%20technologies%20and,households%20both%20time%20and%20money.
[208] Brink, E., Falla, A. M. V., & Boyd, E. (2023). Weapons of the vulnerable? A review of popular resistance to climate adaptation. *Global Environmental Change*, 80, 102656.

or mistrust stemming from marginalisation. This recognition can foster constructive dialogue and result in policies rooted in equality and justice."[209]

We can emphasise that climate policy is in the public interest because the provision of a stable climate is a global public good[210] and therefore resistance is negative. However, there is no single definition of public interest, which means that there are a plurality of publics and their resulting interests. Therefore, there should be a conscious effort to bring these publics together to find and leverage common interests[211] and manage conflict in a constructive way, starting through mapping different forms of active conflict and also passive resistances. In addition, it is important to value the knowledge of vulnerable individuals and groups[212], while engaging them in the co-creation of solutions to various problems associated with climate change. This should also lead to coalition building, which can act as 'transformative encounters' that produce or induce wider social change or provide opportunities for learning and knowledge exchange[213].

In order to engage with people's resistance in the perspective of socially just climate policies, some specific recommendations addressed to policymakers were identified within ACCTING. Among others:

- Acknowledge and understand resistance, also exploring both the vulnerabilities and the positions of the actors who are resisting
- Approach resistance as a call for 'better' platforms for dialogue and policy co-design and employ various tools for facilitation, conflict resolution, and dialogue-building to navigate transition processes slowed down by resistance; so, engage with resisting marginalised communities and people through their networks, resources, and wisdom, and amplify their role as agents of change (and engage also with disadvantaged groups who do not resist)
- Increase the "appeal" of climate policies by addressing points of tensions between social and environmental concerns[214].

[209] Borhan Türeli B., Cacace M., Düzel E., Strid S. (2025). Transformative Resistance for a Just and Inclusive European Green Deal- ACCTING Project. Available at: https://zenodo.org/records/15006314
[210] Lipari, F., Lázaro-Touza, L., Escribano, G., Sánchez, Á., & Antonioni, A. (2024). When the design of climate policy meets public acceptance: an adaptive multiplex network model. *Ecological Economics*, 217, 108084. Available at: https://www.sciencedirect.com/science/article/pii/S0921800923003476
[211] Kerremans A, Denis A (2025). D4.3 ACCTING Overall report Open Studios second cycle. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal).
[212] Reid, H., Swiderska, K., King-Okumu, C., & Archer, D. (2015). Vulnerable communities: Getting their needs and knowledge into climate policy. Available at: https://www.iied.org/sites/default/files/pdfs/migrate/17328IIED.pdf
[213] Berriane, Y., & Duboc, M. (2020). Allying beyond social divides: An introduction to contentious politics and coalitions in the Middle East and North Africa. In *Allying beyond Social Divides* (pp. 1-21). Routledge.
[214] Borhan Türeli B., Cacace M., Düzel E., Strid S. (2025). Transformative Resistance for a Just and Inclusive European Green Deal- ACCTING Project.

PART THREE – EXPERIMENTAL ANALYSIS IN TWO CROSSEU HOTSPOTS

The third section of this deliverable reports the findings of the initial analysis on the social effects and other related social aspects of the ongoing climate policies at the local level focused on three hotspots in the CROSSEU case studies:

- Trentino Alto Adige Region (South Tyrol and Trentino) in Italy (CS4)
- Southwestern Denmark coast (CS3).

This is a "test" analysis that will be extended in the next months to 12 hotspots in the various CROSSEU Case-Studies

1. Social effects of climate policies in Trentino Alto Adige

1.1. Overview

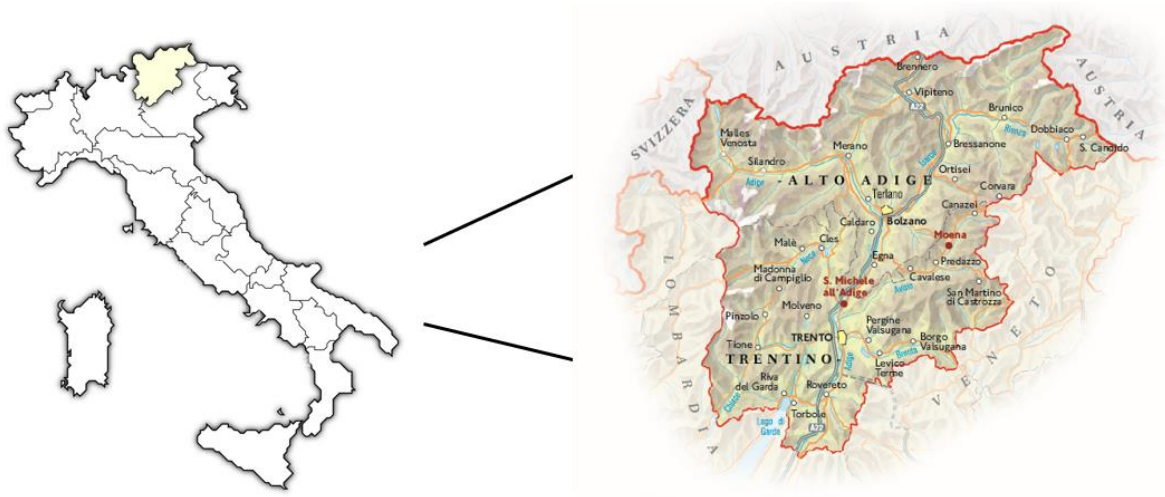

Figure 8 – Trentino Alto Adige Region (South Tyrol and Trentino) in Italy (CS4)

Source: CROSSEU D2.1

Trentino Alto Adige is the northernmost Italian region and is considered almost entirely mountainous with the exception of the Adige Valley and the Valle dei Laghi below 200 m and therefore considered plains. Trentino Alto Adige includes two autonomous provinces:

- The province of Trento (Trentino), predominantly Italian speaking
- The province of Bolzano (Alto Adige/South Tyrol), predominantly German speaking.

The region is inhabited by 1.1 million people. In addition to Italian and German speakers, there are numerous minorities, "Ladini" and more than 90,000 immigrants.

Trentino-Alto Adige is a region in Italy known for its mountainous terrain, which makes it susceptible to various natural hazards like landslides, floods, and avalanches. Additionally, heatwaves and cold waves are also common. The region's geological and geomorphological structure contribute to its vulnerability to these events.

Landslides and Mudflows: These are a significant concern, particularly in mountainous areas. Between 1970 and 2019, landslides in Italy caused 1085 deaths, 10 missing people, and 1454 non-fatal injuries.

Flooding: Due to the presence of numerous lakes and rivers, Trentino is prone to flooding.

Avalanches: The mountainous terrain of the Alps in Trentino-Alto Adige makes it susceptible to avalanches, especially during winter.

Heatwaves and Cold Waves: These extreme temperature events can have significant impacts on the region, particularly during summer and winter months.

Other Hazards: Wildfires are another potential hazard, especially during dry periods.

One of the most important hazards in the recent history in Trentino Alto Adige has been the Vaia storm impacted that the Eastern Italian Alps between October 27th and the evening of October 29th, 2018. This event, occurred at the end of a climatic anomaly of prolonged drought, brought extremely high winds and persistent rainfall to the region and caused millions of trees to fall, resulting in the destruction of tens of thousands of hectares of alpine coniferous forests (an unimaginable event according to some of the people interviewed as part of CROSSEU).

The region's vulnerability to these natural hazards highlights the importance of proactive mitigation and adaptation strategies.

South Tyrol

In 2023, the Provincial Council of Bolzano adopted the "South Tyrol Climate Plan 2040"[215] (Klimate Plan 2040), an integral part of the "Everyday for Future" Sustainability Strategy and a tool for achieving climate neutrality by 2040 (another one had been approved previously in 2009). It is accompanied by the "South Tyrol Climate Energy Plan 2050".

Through this Plan, the Provincial Government proposes that South Tyrol be at the forefront in the fight against global warming according to various approaches. These range from the reduction of activities and behaviours that lead to the emission of greenhouse gases, to the replacement of activities responsible for emissions, up to the increase in energy production from renewable sources.

The "South Tyrol Climate Plan 2040" is an interdisciplinary and dynamic program. Interdisciplinary because it brings together all the relevant sectors of society, involving them in the reduction of greenhouse gas emissions. Energy, mobility and the agricultural sector, in particular, are three of the major areas that require profound transformation. At the same time, the plan is dynamic, therefore not established once and for all, but is adapted in an evolutionary

[215] https://www.obiettivoeuropa.com/bandi/trentino-alto-adige-piano-clima-2040

process. This approach allows to respond to new developments and challenges by constantly updating the objectives and intervention measures.

The Plan is implemented in connection with society. First of all, the "Citizens' Council for Climate" is established, composed of 50 citizens selected by lot and intended to contribute to a transparent and comprehensible definition of the Climate Plan. The members of this Council follow and evaluate the monitoring operations, debate new proposals and report directly to the Provincial Council. The "Stakeholders' Forum" is also established, a body that brings together organisations and representatives of interest groups with a key role in the path towards climate neutrality. From the discussion carried out within this forum, it is expected that different interests and positions will emerge, to be taken into due consideration and gradually integrated into the Climate Plan.

The Climate Plan 2040 includes 157 actions classified in areas[216]:

- Communication and Awareness
- Heavy Vehicles and Freight Transport
- Passenger Transport
- Construction
- Heating
- Agriculture and Forestry
- Industry
- Tourism
- Private Tertiary
- Grey Energy
- Production, Storage and Distribution
- Biomass
- Long-term CO2 Sinks
- Resilience and Adaptation
- Food and Consumption
- Support Services, Planning and Certification
- Research.

People interviewed (in the frame of CROSSEU T4.3) emphasised that the Klimate plan 2040 is a guidance document. Some of the proposed measures are, in fact, already being implemented; others, while not yet, are well determined, while still others are desires or goals to be achieved that are still undetermined. In a few cases (e.g., "resilience and Adaptation"), a regulatory process of operationalisation is underway that should have concrete effects as early as the end of 2025.

Environmental movements (CSA4_5) are promoting the passage of a Climate-related Law[217] to make at least part of the Climate Plan measures binding, including establishing the mechanisms and financial coverage for their implementation (and for strengthening the monitoring system).

[216] https://www.klimaland.bz/it/piano-clima-alto-adige-2040/
[217] As South Tyrol is an autonomous province, it has the power to approve laws that are valid within its territory.

The Climate Plan is linked to other planning tools such as the Smart Specialisation Strategy, the Sustainable Tourism Plan, the Mobility Plan, the Social Plan, the Forest Agenda and many others.

A monitoring system for greenhouse gas emissions in four major sectors (transport, heating, industry and agriculture) and total emissions has also been established in South Tyrol. The latest available data (2022) shows, moreover, that emissions over the past few years have increased.

Maps related to environmental hazards are available for 99 out of 116 municipalities (CSA4_2).

Trentino

The climate action of the Autonomous Province of Trento has been entrusted to the Work Program "Trentino Clima 2021-2023", approved with Resolution of the Provincial Council no. 1306 of 7 August 2021, with the aim of defining the Provincial Strategy for Mitigation and Adaptation to Climate Change.

The mitigation measures to reduce greenhouse gas emissions are essentially those identified by the Provincial Environmental Energy Plan 2021-2030. For adaptation actions to manage and limit the now inevitable impacts of the climate crisis on the Trentino territory, a series of activities are underway that aim to identify measures in the various environmental systems and socio-economic sectors, which will then be integrated into the sector plans and programs, as has already been done for example for the Water Protection Plan 2022-2027, which includes possible adaptation measures for the management of climate risks related to water resources[218].

A process is currently underway in Trentino aimed at adopting the "Provincial Climate Change Mitigation and Adaptation Strategy," which will be the reference tool to guide action to contain ongoing warming and counteract the negative impacts of climate change. In April 2025, the provincial government adopted the report "The State of the Climate in Trentino. The Impacts of Climate Change on Environmental Systems and Socioeconomic Sectors"[219], and a timeline of activities was updated, with the preliminary version of the Strategy to be adopted by the end of 2025 and the final version by the end of 2026[220]. This report deals with the impacts of climate change on the environment and nature, the economy and society.

In Trentino too, the process is interdisciplinary, dynamic and implemented in connection with society with the establishment of the Provincial Climate Change Forum, a coordinating body of actors involved in communication and education on the issue of climate change in Trentino. Among others, around 900 Trentino citizens participated in the survey between March and June 2023, indicating as priority areas for urgent adaptation action: Water and water

[218] https://www.appa.provincia.tn.it/News/APPA-informa-Newsletter-periodica/Azione-per-il-clima-in-Trentino-a-che-punto-siamo
[219] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino
[220] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Verso-la-Strategia-provinciale-di-mitigazione-e-adattamento-ai-cambiamenti-climatici

resource management, Agriculture and animal husbandry, Disaster risk reduction, Biodiversity and ecosystems, Health.

Maps related to environmental hazards are available for all the municipalities (CSA4_1).

1.2. Social concerns

Before going into the merits of how social aspects are considered or not in climate policies, it seems useful to report some related results of the survey implemented in CS4, which involved a representative sample of North eastern Italy householders (2000 respondents).

- While globally 39% of people received advanced warning information before a flood event, this % decreases to 18% among the elderly (+65 years); to 23% among retired people; to 23% among the homemakers.
- There is a clear prevalence between "preferring to live in a flood risk area, because there are other advantages for me" rather than moving to a reduced flood risk area.
- Early-warning systems prioritise the needs of gender and vulnerable people in society only according to 32% of the interviewees.
- There is a prevailing agreement in relation to these statements (score varies between 1 and 5):
  - Public policies related to flood management are gender sensitive (e.g., considering and valorising gender differences) (3,3)
  - Public policies to reduce flood risk are adapted to the specific needs of disadvantaged groups of people (e.g., disabled people, elderly people, children, people with a migration background) (3,3)
  - Public policies to reduce flood risk have had negative effects on disadvantaged groups of people (e.g., people living in flood-prone areas who have to abandon their homes and who are not assisted in being relocated) (3,4).

Even though there is no need, it is then reiterated that the greater difficulty of the elderly to access early warning that only a minority of people believe is adequate for vulnerable people. Finally, there is a prevalence to consider that the "Public policies to reduce flood risk have had negative effects on disadvantaged groups of people". Therefore, these policies "are (now?) adapted to the specific needs of disadvantaged groups of people" and "gender-sensitise".

South Tyrol

Klimate Plan2040 emphasises the importance of the social aspects in connection with climate change. The Plan pursues a clear political vision (in connection with climate) that corresponds to South Tyrol's desire to be an area of social welfare and is based on a joint set of values that are essentially supported by empathy and solidarity between generations and also between different social groupings. Furthermore, it is emphasised that South Tyrol is an area characterised mostly by well-being. Solidarity should therefore also be extended to less wealthy areas of the world. Finally, it is emphasised that the Klimate Plan is to be implemented in close connection with the "Social Plan

2030" (document guiding the consolidation and orientation of the social system of the Province of Bolzano)[221].

Communication with citizens and stakeholders (in the Plan) is intended to be two-way, i.e., information and participation, monitoring and feedback are at least equally important. Citizens and stakeholders must also contribute to the periodic updating of the Plan (CSA4_4).

However, if this is well one of the 17 areas of the Klimate Plan 2040, its description is very brief. It is therefore not surprising that in the interviews it was highlighted that this area should be given much more importance.

- There is currently a great lack of dialogue with citizens and their mobilisation, albeit some technical tools exist (films, courses in schools, both with students and teachers, etc.)
- These are things done in a one-off manner, which should be done in a structural way, not only in relation to possible emergencies (for example also collaborating with potential citizen volunteers "in peacetime", including environmental issues as ordinary programs in school and not only as one-off projects)
- It is also necessary to use information tools that citizens consult ("now a social network like TikTok is much more important than a news broadcast").

In this unsatisfactory situation, there are also episodes of conflict between citizens and authorities regarding the opportunity to carry out certain works which, although essential from an environmental point of view, are not "accepted" on a social level (CSA4_2). There is also growing social disillusionment, especially among young people (CSA4_5).

Funding should also increase: "let's assume that the current ratio between the amount invested in protection works (e.g., hydraulic works) and the amount invested in relations with citizens, including early warning, is today 80 to 1; it should at least become 8 to 1" (CSA4_3).

A project funded by the European Commission has also been launched which includes a tour of the municipalities of South Tyrol to raise awareness, explain the adaptation system and create networks (CSA4_4).

Trentino

Several times in the report "The State of the Climate in Trentino. The Impacts of Climate Change on Environmental Systems and Socioeconomic Sectors", the issue of the socio-economic effects of climate change are highlighted, in particular in terms of the potential worsening of social inequality.

> *"The negative effects resulting from climate impacts can exacerbate new or pre-existing social and economic inequalities, creating disparities in terms of conditions of well-being and access to resources, work and, more generally, the prospect of a dignified and safe life. For the impacts of slow-onset climate change, such as the progressive increase in temperature and the increase in conflicts over the use of available water resources, it is possible to assess in*

[221] https://issuu.com/landsuedtirol-provinciabolzano/docs/piano_sociale_provinciale_2030

advance the socio-economic consequences on the most vulnerable segments of the population and on the cohesion and safety of local communities. On the contrary, extreme climate events and associated natural hazards, such as heat waves, storms, floods and landslides, can suddenly cause significant damage to homes and private property, as well as to production facilities in various sectors, with significant but unpredictable negative consequences on the social network and the economy of the communities directly and indirectly affected (…) the greatest negative impacts will affect the most vulnerable segments of the population, with fewer resources, not only financial, including the groups at greatest risk. Furthermore, from a generational perspective, young people are the most vulnerable group as their future possibility of a dignified life and a good level of well-being and security risks being more compromised than that of previous generations (…) climate change could cause significant impacts in mountain communities, especially those whose economy depends predominantly on a single sector (…). Furthermore, climate change risks for the health sector could contribute to overloading local health, social and health-care systems, exacerbating future inequalities in access to and use of related services."[222]

In addition to the effects on disadvantaged people, it is also explained

"how the greater frequency and severity of drought situations, which could increase in the future conflicts related to the use of water resources between productive sectors with currents, such as agriculture, industry, hydroelectricity and tourism, could contribute to increasing the risk of less stable employment and less social cohesion in local communities, but also trigger conflictual social dynamics, both at a political level and with the population of the bordering regions with which Trentino shares the largest water reserves of rivers and lakes."[223]

The interviewees show a strong attention to social issues. In particular, it is emphasised how in Trentino the climate is changing, but also the society with a claim of security that cannot be fully ensured because it is not sustainable on an economic, environmental but also social level, since it would entail a disproportionate burden (CSA4_1). A notable change in the composition of society (strong presence of migrants, who are however almost completely absent among the volunteers who deal with the environment) and in the way of building communities is also highlighted (in particular, there are fewer ties with the territory).

In Trentino too there is a lot of emphasis on Communication and awareness-raising underlying the importance of a strong involvement of citizens and stakeholders, both in the consulted documentation and in the interviews (the importance of intensifying communication is underlined to strengthen citizen awareness and their involvement, also through the cooperation with schools and also "evenings" with citizens in the various valleys of the Province in which 70/80 people participate at a time; "in these "evenings", moreover, we try to build a "historical memory" (CSA4_1), thanks to the availability of a database with about 4000 phenomena connected to natural hazards in history; with many photos; integrated with the local press; attention is captured by showing

[222] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino
[223] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino

participants their own streets and squares affected (to show what happened and therefore can happen again).

1.3. Climate policies' effects on inequality, vulnerability and on disadvantaged people

South Tyrol

With the measures included in Klimate 2040 Plan, the share of the population at risk of poverty is expected to decrease by 5 percentage points by 2030 compared to 2019 levels (it was, approximately 18% in 2019).

The Plan therefore states that the measures included in it should distribute the unavoidable burdens in a socially acceptable manner and fairly compensate them with additional measures (e.g., mitigation of energy price increases for households at risk of poverty or pre-financing of investments to reduce domestic emissions). The Plan clearly states that attention must also be paid to distributional equity between the generations: in case of doubt, it will be the 50+ generation that will have to bear a greater share of the burden.

However, when one gets into the merits of the Plan's specific measures, these great intentions are mostly forgotten. There are only three explicit references.

1. The removal of architectural barriers in railway stations (in favour of the disabled).
2. The launch of pilot projects for on-demand bus services, especially in peripheral areas (ensuring sustainable mobility also for those who cannot afford an electric car and cannot use a bicycle).
3. The application of certain minimum standards in the field of housing, both for households and for businesses, combined with various forms of incentives to ensure that all social groups can afford the planned measures (e.g., in relation to the 'ClimateHouse').

It is then specified that adequate financing instruments (so-called green bonds, cooperation with guarantee cooperatives) will have to be devised to solve the problems of liquidity and creditworthiness.

Moreover, as well described in CROSSEU D4.7, the Provincial Authority has introduced the Emergency interventions in case of natural disasters fund and the Disaster Relief Grants for Agricultural and Forest Properties. The Emergency interventions in the event of natural disasters fund prioritises low-income households, which often face greater financial issues. Moreover, the support is restricted to primary residences (preventing support to secondary homes, usually owned by wealthy people). The Disaster Relief Grants for Agricultural and Forest Properties extends these equity considerations and distributional concerns to the agricultural and forestry sectors.

Further elements regarding the social impacts of climate measures and the measures adopted to mitigate or eliminate their possible negative effects emerge from the interviews. For instance, the province should adopt a measure to help people who currently live in a "red" zone (i.e., at serious risk associated with possible natural disasters) to move elsewhere (CSA4_2). However, according to the interviewees, much more should be done. Some examples are listed below.

- Risk information and any other useful information is almost always available only in German and Italian (sometimes in English). No account is taken of those who do not speak these languages, both immigrants and tourists (even these, although often rich, become "vulnerable" from this perspective) (CSA4_3).
- Much more attention should be tailored to the elderly having in mind the increased importance of the heat waves. Indeed, relationships with nursing homes/rest homes, are presently intensifying and need to be much more informed (receive weather reports) and, through them, reach other elderly people (CSA4_3).
- The Climate Plan provides for the replacement of boilers powered by fossil fuels; if and when this measure becomes mandatory, people in precarious economic conditions (who are its main beneficiaries) will not be able to comply with this measure (CSA4_5).

Moreover, interviewees highlight that in the public bodies having responsibilities in the design and implementation of climate policies there is a lack of human resources having specific competences on inequality and protection of vulnerable groups (as well as on communication) (CSA4_2 and CSA4_3). Furthermore, some municipalities do not have the needed financial resources and professionals to implement the measures of the Klimate Plan that would be their responsibility, unlike the richer Municipalities. This raises an issue of equity between Municipalities and therefore between their respective populations (CSA4_3 and CSA4_5).

Finally, the monitoring of the implementation of the Klimate Plan 2040 is structured from two perspectives: that of the planned, initiated and completed measures (input monitoring) and that of the achieved effects in terms of CO_2 emissions (output monitoring, relating to fossil fuel consumption, methane and nitrous oxide emissions). Despite the awareness of their potential problematic nature, nothing is provided for the social effects of the measures taken.

Trentino

The report "The State of the Climate in Trentino. The Impacts of Climate Change on Environmental Systems and Socioeconomic Sectors" highlights how mitigation and adaptation actions implemented to combat the causes and limit the damage of climate change can generate effects on economic activities, on workers, on the health and well-being of citizens, putting the social components with less economic availability in difficulty with a consequent increase in inequalities and worsening of social tensions. Furthermore, "the increase in the severity of climate impacts, as well as the socio-economic impact of the implementation of the same mitigation and adaptation policies, could contribute in the future to create greater tensions and social conflicts on these issues" [224].

Therefore, "the socio-economic impacts resulting from the implementation of mitigation policies and the so-called "ecological transition", if not accompanied by the adoption of necessary and adequate support and, where appropriate,

[224] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino

compensation tools, may increase social and economic inequalities in the future, affecting the most vulnerable and marginalised population groups to a greater extent. Some low-income groups, with less financial support and socio-cultural resources, may have greater difficulty in facing a necessary change of occupation and acquiring new professional qualifications. Even the increase in the cost of living, for example in the case of purchasing an electric vehicle, photovoltaic panels or lower-consumption and higher-efficiency household appliances, could further aggravate pre-existing social inequalities or induce new ones. The categories most affected by the socio-economic consequences of climate change may also include women, mainly due to the wage differences that still exist between genders, people with disabilities, the elderly and young people, the latter forced to face a more uncertain and less prosperous future than in the past due to the impacts of climate change even without have responsibilities towards previous generations"[225].

In Trentino too, these great intentions are not translated into action in the Work Program "Trentino Clima 2021-2023". Hopefully they will inspire the "Provincial Climate Change Mitigation and Adaptation Strategy," currently under preparation, as expected, by interviewees people too.

Finally, interviewees highlight the lack of competences on societal issues and communication in the Provincial Authority (CSA4_1).

2. Social effects of climate policies in the western coasts of Denmark

2.1. Overview

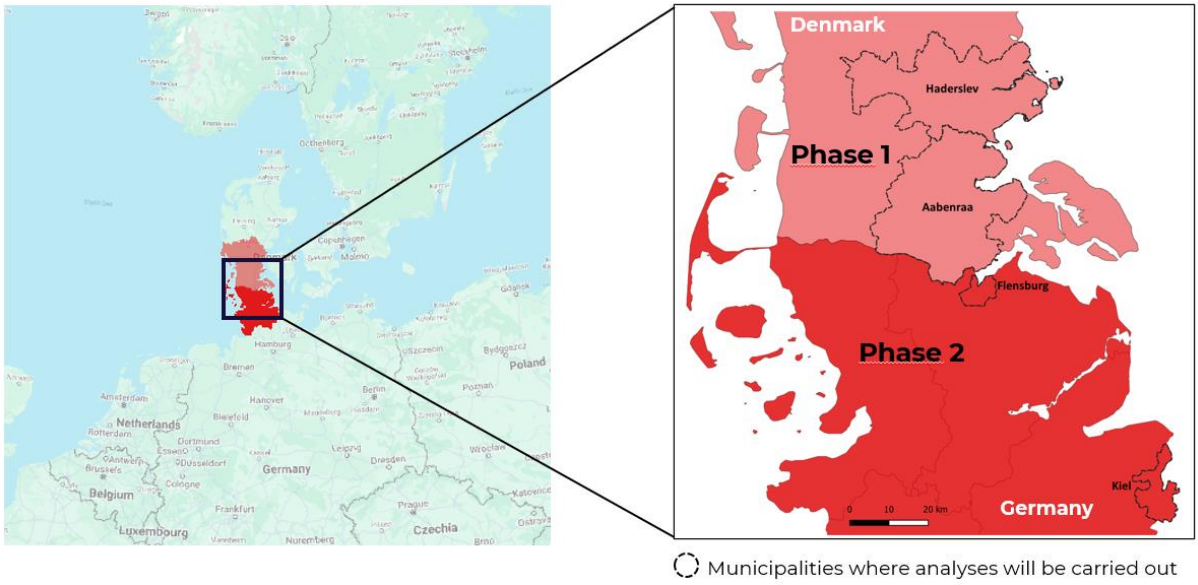

Figure 9 – CS3 in Denmark

Source: CROSSEU D2.1

[225] https://www.appa.provincia.tn.it/Documenti-e-dati/Documenti-tecnici-di-supporto/Lo-stato-del-clima-in-Trentino

The southwestern coast of Denmark, particularly in the Jutland peninsula, is characterised by the Wadden Sea, a unique international coastal region also stretching through Germany and the Netherlands. This area features extensive sandbars, dunes, and open sandy beaches.

Denmark coasts are affected by severe coastal floods. Recently, just in autumn 2023, a low-pressure storm named "Pia" hit Denmark, with wind speeds of 157 km/h, raising water levels around several mid-sized towns with its hurricane-force winds. It followed a number of violent storms. In February 2024, tidal flooding returned to parts of the coast. After the event in end 2023, the Danish government invested 20 million euro (150 million Danish kroner) in coastal protection. The cities of Juelsminde, Køge, and Esbjerg received a commitment from the Coastal Directorate (Danish Coastal Authority) to support their protection projects[226]. We can remember that Denmark has a long history of managing water resources and protecting its coastline, which informs climate adaptation planning. Previous assessments and strategies have identified key climate risks and vulnerabilities, which are key components in adaptation plans now. State assistance to municipalities for coastal protection projects is assured until 2027. Further 1,142 billion DKK are allocated for sand nourishment on the west coast from 2025 to 2029.

The mapping of climate risks and adaptation plans is by law solely the responsibility of the municipalities in Denmark. The most important issue to be considered in this respect is coastal protection. It should be noted, however, that the events of autumn 2023 went far beyond what could have been expected from the available flood prone maps.

The combination of a low-lying coastline with high population densities, infrastructure and socio-economic activities next to the sea makes the southwestern coast particularly exposed and vulnerable to the occurrences and consequences of flooding during storm surges. Indeed, cities (some of the Danish coastal cities are like 900 years old) and high intensity transport and critical infrastructure, such as road, rail and port infrastructure, can be severely affected during flooding events. Decision makers and private investors in the region are in the process of planning for future infrastructure and economic development, including disaster risk management, and adaptation, and there is extensive stakeholder engagement already included in this process. The focus of decision makers is now to prepare and adapt settlements, infrastructure and activities to the rising threat of future storm surges.

Socioeconomic indicators suggest that the regions are among some of the wealthier in Europe, which may positively impact their ability to recover from extreme events and adapt to future climate change impacts.

Here, municipalities as Esbjerg, Aabenraa and Haderslev, as well as most of the others in Denmark, came together to develop ambitious climate action plans aligned with the Paris Agreement, in the frame of the DK2020 and the C40 Covenant of Mayors, empowering local governments to take the lead in climate

[226] https://www.waternewseurope.com/denmark-invests-in-coastal-protection-after-2023-floods/

action[227]. This ensured a standardised and robust approach to climate planning across municipalities, involving also citizens in climate planning and action. Beyond adaptation measures, municipalities are implementing various initiatives to reduce emissions and enhance climate resilience. Examples include investments in renewable energy, promotion of sustainable transportation, energy efficiency retrofits in buildings, and initiatives to reduce waste and promote circular economy. Regular reports on municipal adaptation planning are supplied to the C40 network, which municipalities voluntarily signed up to. Municipalities are members of the Climate Alliance[228], entailing, among others, a culture of knowledge sharing and collaboration among municipalities, enabling them to learn from each other and accelerate progress.

Finally, it could be highlighted that so far, focus had been mainly on mitigation action, but this might change in the future, because Denmark has implemented action to become carbon-neutral, and because citizens become more and more aware of impact from natural hazards, more specifically, storms and flooding and will demand protection/adaptation.

2.2. Social concerns

Denmark actively involves social partners such as trade unions (e.g., Fagbevægelsens Hovedorganisation (FH), the Danish Confederation of Trade Unions) and employers' organisations (e.g., Dansk Industri, the Confederation of Danish Industry) in climate policy discussions. This collaborative approach ensures that workers' rights and concerns are taken into account in the transition process. This 'Danish Model' of social dialogue is deeply rooted in the country's political culture and contributes to a more inclusive and equitable transition. Similarly to what has already been stated in Section 1.2, in the West Coast of Denmark, worsening inequality is one of the effects of climate change.

The recent research made with the Technical University of Denmark highlights, according to an interviewee that (quotation from the interview) "...the damages will occur mostly, of course, in larger cities where all the wealth and the values are collected. But if you look at the expected damages compared to how many people live in the area, then, in effect, the damages are much higher (...) in remote areas, far away from the larger cities and these areas are often also some of the poorer areas. So, if you look at who will be, who's there to cover the costs, how many people are there to cover the cost or to cover adaptation, the amounts are the largest in these remote areas. So, there is a very, severe social dimension of the flooding and we are afraid that the social consequences will be quite high, because in these poorer areas, typically rural areas of Denmark, income levels (...) are much lower than in other in the city areas" (CSA3_5).

As mentioned above, citizens should be involved in climate planning. According to the two civil servants interviewed in two municipalities on the west coast of Denmark (Aabenraa/CSA3_1 and Sønderborg/CSA3_2), which are among the municipalities most affected by coastal flooding, "bottom-up initiatives in the local community are at least as important as public policy in storm

[227] Realdania (2024). DK2020. Retrieved November 18, 2024, from https://realdania.dk/projekter/dk2020
[228] https://www.climatealliance.org/about-us/organisation.html

management" (one strongly agrees with this statement, the other "somewhat agrees").

However, in the other interviews (with people from NGOs or academia) some concerns are raised in this respect.

- "There's a bit of sort of technocratic approach" (CSA3_4) versus an effective democratic consultation "... municipalities I talked to, they have a problem with doing stakeholder engagement and then going up to the political level, and the politicians have maybe talked to one or two citizens that have called them complaining, and then the whole process in trying to engage the, the neighbourhoods and the stakeholders are, like, completely irrelevant".
- There is not sufficient awareness about the fact that "you'll never succeed, never, if you don't bring citizens into play... if you don't include the citizens in coastal adaptation plans" (CSA3_3).

2.3. Climate policies' effects on inequality, vulnerability and on disadvantaged people

In Denmark, with regard to storm and floods (which are the subject of CROSSEU's case-study) has been in place the Storm Flood Damage Levy (see more specifically, CROSSEU D4.7 un this respect). A public mandatory insurance scheme, to which all property owners in Denmark are required to contribute through an annual levy which is calculated based on the property's value and flood risk exposure. In the event of a storm surge, the fund provides financial compensation to property owners for damages caused by flooding. Through uniformity across the country, a certain redistribution occurs between those who live on the coast (and must pay for adaptation/protection) and those who do not.

However, an equitable distribution of costs and benefits, by considering affordability for low-income households or those in high-risk areas is not ensured so far.

Indeed, according to the two public officials interviewed (already mentioned in Section 2.2; CSA3_1 and CSA3_2), social inequalities have not been considered as an issue in the design of existing policies/measures to manage the impacts of storms. Indeed, these measures are not gender-sensitive and are not tailored to the specific needs of disadvantaged groups of people (e.g., disabled people, the elderly, people with a migration background; etc.). Notwithstanding this, they both disagree with the statement: "Public policies to manage impacts of storms have had negative effects on disadvantaged groups of people (e.g., people living in areas prone to coastal flood that have to abandon their homes)" (one strongly, the second one "somewhat"). Therefore, according to them, there would be no focus on the issue of inequality and disadvantaged people, but this would not be problematic in any way.

This in confirmed also by the further three interviewees. Current policy runs the risk to "split the population (...) in people who have money, who can afford to protect, and people who can't" (CSA3_3), as individuals with more wealth can afford to physically protect their property as well as exert influence on their

favour (and the others not). Moreover, the zoning policy, implemented in Denmark and considered, generally speaking, an effective policy can also have unintended effects: "... if you are retired, if you're a retiree, you can, if you have had a summer house for three years, you're able to move out full time in it. (...) You're also allowed to be in the summer house outside of the summer season. So, when the, when the emergency response teams, they have to prioritise, they would of course always take residents, like, full time residents areas, but then you would have a potential vulnerable population somehow, zones, like retired, retired people or people that might require extra help getting away from their houses" (CSA3_4).

Moreover, according to one of them "inequalities maybe become stronger... the rich people move out because of risk, it will be the poor people moving in. Like, possibly. But people still want to live near the ocean, so maybe it's a long-term effect". So, policy measures to stop increase of inequalities would need to be about creating awareness: "No matter whether you live on the coast or you live 5 kilometers, 5 or 10 kilometers away, right, we all we all somehow are coastal users. So, we all somehow use the coast for different purposes, right? And thereby we also all have a responsibility to take care of the coast, but also increasing erosion and flooding run, even though it's not my house being flooded thereby" (CSA3_3).

3. Some first insights

It is far too early to draw any conclusions (that, conversely, will represent, of course, the final part of D4.6).

The investigation carried out in the three hotspots has essentially contributed to verifying and refining the methodological approach that will be used in many CROSSEU Case Study hotspots in the coming months. However, it is possible to make some initial observations based on the information in this section relating to Trentino Alto Adige and the western coast of Denmark.

a) In both the design and implementation of climate policies, there appears to be a general awareness of the different social and economic effects of climate change on various groups of people. It is widely recognised that disadvantaged groups suffer worse and wider effects (i.e., climate change exacerbates social and economic inequalities).
b) However, there is limited and not at all widespread attention to the needs of gender and vulnerable people.
c) Also limited and not widespread is the awareness that climate policies must be designed and implemented in a way that avoids, or at least alleviates as much as possible, their possible/potential negative (unintended) effects on (some) social groups (mostly disadvantaged people), in terms of inequality, social exclusion and decreased social cohesion, which can generate resistance and conflict. While there is often an awareness of this in the conception/design of climate plans (or equivalent documents), as well as the necessary connections with social

policies (sometimes including the identification of additional measures aimed at fairly compensating disadvantaged groups), this awareness is not always translated into practice when implementing the measures inherent to climate policies.

d) Indeed, in practice, only a few climate policies are adapted to the specific needs of disadvantaged groups, such as disabled people, the elderly, children, people from migrant backgrounds and women (due to gender pay differences). However, there have been some positive examples of this. Among others:
   i. the application of certain minimum standards in the field of housing, both for households and for businesses, combined with various forms of incentives to ensure that all social groups can actually afford the planned measures in South Tyrol
   ii. the prioritisation of low-income households from the "Emergency interventions" fund in South Tyrol.

   However, according to many among the interviewees much more has to be done.
e) The negative effects on disadvantaged groups are highlighted, such as the elderly having greater difficulty accessing early warnings, and people lacking access to essential risk management information in a known language; "split of population [...] in people who have money, who can afford to protect, and people who can't").
f) Social impacts of climate policies/measures are not monitored (or not enough).
g) From what little can be said so far, representatives of NGOs and civil society in general (including representatives of the Academy) seem to have a much greater awareness of the problematic nature of the situation described above than public officials.
h) There is widespread awareness of the importance of communication and citizens' involvement in risk management (e.g. the 'Danish model' of social dialogue). However, communication is often only top-down and does not use the best communication channels among citizens. Citizen and stakeholder involvement is also very limited and rarely 'structured' (e.g. there is a lack of dialogue and citizens are not mobilised effectively).
i) In public administration, the lack of human resources having specific competences on inequality and protection of vulnerable groups (as well as on communication) is often highlighted.

PART FOUR – CONCLUSIONS

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1. Lessons learned

Of the results that emerge, in terms of content, we have already discussed in the previous section. Instead, here we are interested in emphasising three aspects, which are functional for the continuation of the work within T4.3.

- Issues at the core of T4.3 (social aspects and consequences of mitigation and adaptation measures with a specific focus on inclusion/exclusion of disadvantaged people, equity/inequality, just transition/social justice, etc.) appear to be very relevant, not only in the debate among the scientific community and the international organisation, but also among policy-makers and further people (NGOs, environmental movements, etc.) dealing with climate policies at the local level (e.g., these issues appears to be often in the Agenda).
- These issues are often included in the policy planning; however, only sometimes they are operationalised (even partially) in the adopted and implemented mitigation and adaptation measures. Indeed, a step forward is often needed to switch "from words (or thoughts) to action".
- Based on the experimentation implemented in three hotspots, the theoretical and methodological frameworks adopted so far in T4.3, appear relevant.

This work is intended to enable the CROSSEU project to make its own contribution in order to proceed in this direction, i.e., to ensure that social justice issues should be better incorporated into climate policies, addressing the needs of disadvantaged people, increasing the capacity of different social groups to adapt to climate risks. Possible positive active role played in relation to climate change by disadvantaged people, considering their specific vulnerability profile, should be also investigated.

2. The way forward

In the coming months, work in the three hotspots reviewed so far will continue and intensify. Most importantly, it will be expanded to an additional eight hotspots (for a total of 11). In principle, the hotspots listed in the table below (classified according to CROSSEU case-studies) will be considered. No hotspots were selected for CS7 and CS8, as these are not expected to be local level and, therefore, do not seem relevant to this investigation.

Case Study	Country/Region	Climate Challenge	Selected hotspot(s) for T4.3 so far
1 STL HEAT	Czech Republic, United Kingdom	Heat waves	Prague and Southern Moravia London
2 STL DROUGHT	Romania	Droughts	Dobrogea Bărăgan Plain

Case Study	Country/Region	Climate Challenge	Selected hotspot(s) for T4.3 so far
3 STL STORM	Denmark	Storm surges	Municipalities in the Western coast of Denmark (Aabenraa, Haderslev) Municipalities in the north-eastern Germany (Flensburg, Kiel)
4 STL FLOOD	Italy	Floods	South Tyrol Trentino
5 STL SNOW	Romania Austria Italy	Snow hazards	Aosta Province – Italy Landeck district – Austria Argeș county - Romania
6 STL INDIRECT	Lower Danube	Indirect effects of climate change on agriculture	Oner area in lower Danube region
7 STL INDIRECT	Europe	Indirect effects of climate change on power systems	---
8 STL SPILLOVER	Global	Spillover effects of climate change impacts on agriculture	---

The methodological framework already described in Section 4 of the first section of this deliverable will be substantially maintained. As it is well known, it involves the use of two main sources of information: local documentation, including previous research and surveys; and, globally, about 40 interviews with key-informants (local authorities officials, representatives of civil society/environmental movements and eventually researchers) in the 11 hotspots.

Expected timeline should be:

- Final selection of the 11 hotspots, by July 2025
- Possible revision of the methodological framework, by July 2025
- "Field work" (documentary collection and interviews) in the remaining 8 hotspots + possible further investigations in the 3 already considered hotspots, by February 2026
- Overall "field work" data analysis, by March 2026
- Updating and possible completion of the review (section 2), by March 2026
- D4.6 drafting, by May 2026 (including inputs for T4.5)
- D4.6 Finalization, by June 2026.

References

- ✓ ABB (2019). Decarbonization of mining: a realistic way forward. Available at: https://new.abb.com/mining/mineoptimize/systems-solutions/mining-electrification/decarbonization-of-mining-a-realistic-way-forward
- ✓ Alam, M. M., Taufique, K. M. R., & Sayal, A. (2017). Do climate changes lead to income inequality? Empirical study on the farming community in Malaysia. International Journal of Environment and Sustainable Development, 16(1), 43-59.
- ✓ Allwood, G. (2020). Mainstreaming gender and climate change to achieve a just transition to a climate-neutral Europe. *J. Common Mkt. Stud.*, *58*, 173.
- ✓ APFM (2008). Organizing Community Participation for Flood Management. Available at: https://www.floodmanagement.info/publications/tools/Tool_04_Organizing_Community_Participation_for_FM.pdf
- ✓ APFM (2017). Community-Based Flood Management. Available at: https://www.floodmanagement.info/publications/tools/APFM_Tool_4_e.pdf
- ✓ Aria (2010). Déferlement de 50 millions de m3 d'eau au barrage du Vajont, fiche N° 23607, Ministère du développement durable (French Ministry of Sustainable Development) – DGPR/SRT/BARPI, France. Available at: www.aria.developpement-durable.gouv.fr/wp-content/files_mf/FD_23607_Vajont_Italie_1963_.pdf
- ✓ Ashenafi, B. B. (2022). Greenhouse gas emission widens income inequality in Africa. Environmental Science and Pollution Research, 29(31), 46691-46707.
- ✓ Axon, S., & Morrissey, J. (2020). Just energy transitions? Social inequities, vulnerabilities and unintended consequences. *Buildings & Cities*, 1(1).
- ✓ Baarsch, F., Granadillos, J. R., Hare, W., Knaus, M., Krapp, M., Schaeffer, M., & Lotze-Campen, H. (2020). The impact of climate change on incomes and convergence in Africa. *World Development*, 126, 104699.
- ✓ Belasen, A. R., & Polachek, S. W. (2009). How disasters affect local labor markets: The effects of hurricanes in Florida. *Journal of Human Resources*, 44(1), 251-276.
- ✓ Berriane, Y., & Duboc, M. (2020). Allying beyond social divides: An introduction to contentious politics and coalitions in the Middle East and North Africa. *In Allying beyond Social Divides* (pp. 1-21). Routledge.
- ✓ Borhan Türeli B., Cacace M., Düzel E., Strid S. (2025). Transformative Resistance for a Just and Inclusive European Green Deal- ACCTING Project. Available at: https://zenodo.org/records/15006314
- ✓ Botzen, W. J. W., Deschenes, O., & Sanders, M. (2019). The economic impacts of natural disasters: A review of models and empirical studies. *Review of Environmental Economics and Policy, 13 (2), 167–188*.
- ✓ Breil, M., Downing, C., Kazmierczak, A., Mäkinen, K., & Romanovska, L. (2018). Social vulnerability to climate change in European cities: state of play in policy and practice. ETC/CCA Technical Paper
- ✓ Brink, E., Falla, A. M. V., & Boyd, E. (2023). Weapons of the vulnerable? A review of popular resistance to climate adaptation. *Global Environmental Change*, 80, 102656.
- ✓ Brockington, D., & Wilkie, D. (2015). Protected areas and poverty. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 370(1681), 20140271.
- ✓ Brown, K., & Siri, E. (2012). *Sustainable adaptation to climate change: prioritising social equity and environmental integrity*. Routledge
- ✓ Brussevich, M., Dabla-Norris, E., Khalid, S. (2020). Teleworking is Not Working for the Poor, the Young, and the Women. IMF blog. Available at: https://www.imf.org/en/Blogs/Articles/2020/07/07/blog-teleworking-is-not-working-for-the-poor-the-young-and-women .
- ✓ Bui, A. T., Dungey, M., Nguyen, C. V., & Pham, T. P. (2014). The impact of natural disasters on household income, expenditure, poverty and inequality: evidence from Vietnam. *Applied Economics*, 46(15), 1751-1766.
- ✓ Burney, J., McIntosh, C., Lopez-Videla, B., Samphantharak, K., & Gori Maia, A. (2024). Empirical modeling of agricultural climate risk. *Proceedings of the National Academy of Sciences*, 121(29), e2215677121.

- ✓ Cacace, M. & Pugliese F. (eds.) (2024). RL1 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I.
- ✓ Carley, S., & Konisky, D. M. (2020). The justice and equity implications of the clean energy transition. *Nature Energy*, 5(8), 569-577.
- ✓ Cassandro, M. (2020). Animal breeding and climate change, mitigation and adaptation. *Journal of Animal Breeding & Genetics*, 137(2).
- ✓ Cattani, A. D. (2007). Socioeconomic inequalities: concepts and research problems. *Sociologias*, 3(SE), 0-0. Available at: http://socialsciences.scielo.org/pdf/s_soc/v3nse/scs_a01.pdf
- ✓ Change, C. C. (2014). Tackling the Double Injustice of Climate Change and Gender Inequality. *CARE Climate Change*. Available at: https://careclimatechange.org/wp-content/uploads/2019/06/Double_Injustice.pdf
- ✓ Chowdhury, J. R., Parida, Y., & Goel, P. A. (2021). Does inequality-adjusted human development reduce the impact of natural disasters? A gendered perspective. *World Development*, *141*, 105394.
- ✓ Countdown, L. (2022). The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. *The Lancet*, *400*(10363), 1619-1654.
- ✓ Crump, B. (2025). What Is the Difference Between Environmental and Social Justice? Available at: https://bencrump.com/environmental-justice-lawyer/what-is-the-difference-between-environmental-and-social-justice/#:~:text=The%20difference%20between%20environmental%20and%20social%20justice%20is%20that%20environmental,Resources%20Defense%20Council%20(NRDC).
- ✓ Dasgupta, S., Emmerling, J., & Shayegh, S. (2023). Inequality and growth impacts of climate change—insights from South Africa. *Environmental Research Letters*, 18(12), 124005.
- ✓ Dell, M., Jones, B. F., & Olken, B. A. (2012). Temperature shocks and economic growth: Evidence from the last half century. American Economic Journal: *Macroeconomics*, 4(3), 66-95.
- ✓ Dente B. (1990). *Le politiche pubbliche in Italia.* Ed. Il Mulino.
- ✓ Diffenbaugh, N. S., & Burke, M. (2019). Global warming has increased global economic inequality. *Proceedings of the National Academy of Sciences*, 116(20), 9808-9813.
- ✓ Environmental Law Foundation (2024). The Interwoven Paths of Environmental and Social Justice. Available at: https://elflaw.org/news/the-interwoven-paths-of-environmental-and-social-justice/#:~:text=Environmental%20justice%20and%20social%20justice,essential%20components%20of%20healthy%20living.
- ✓ Environmental Protection Agency (2013). Environmental Justice-Related Terms As Defined Across the PSC Agencies. Available at: https://www.epa.gov/sites/default/files/2015-02/documents/team-ej-lexicon.pdf
- ✓ Ercin, E., Kaune, A., Karaman, C., & Orlov, A. (2024). Unraveling cross-border climate risks through climate storylines: An example from Europe's cocoa industry. *Environmental and Sustainability Indicators*, 22, 100359.
- ✓ EU (2023). Climate change? Blame it on production practices, not just cows. CORDIS article. Available at: https://cordis.europa.eu/article/id/32504-climate-change-blame-it-on-production-practices-not-just-cows
- ✓ EU (2023). Climate change? Blame it on production practices, not just cows. CORDIS article. Available at: https://cordis.europa.eu/article/id/32504-climate-change-blame-it-on-production-practices-not-just-cows
- ✓ European Commission (2021). EU Multidimensional Inequality Monitoring Framework. EU website. Available at: https://knowledge4policy.ec.europa.eu/projects-activities/multidimensional-inequality-monitoring-framework_en
- ✓ European Commission (2021). EU Multidimensional Inequality Monitoring Framework. EU website. Available at: https://knowledge4policy.ec.europa.eu/projects-activities/multidimensional-inequality-monitoring-framework_en
- ✓ Fabrizio S., Jaumotte F. and Travares M.M. (2024). Why Women Risk Losing Out in Shift to Green Jobs. *IMF Blog*. Available at: https://www.imf.org/en/Blogs/Articles/2024/10/07/why-women-risk-losing-out-in-shift-to-green-jobs

- ✓ FAIRVILLE (2024) D2.1 "Draft of a common glossary and common grid of analysis". FAIRVILLE (Facing Inequalities and democratic challenges through Co-production in Cities) is an Horizon Europe funded project implemented (also) by K&I. https://www.fairville-eu.org/ .
- ✓ Farrell, C. (2012). A just transition: Lessons learned from the environmental justice movement. *Duke FL & Soc. Change*, 4, 45.
- ✓ Fernández-Aguilar, C., Brosed-Lázaro, M., & Carmona-Derqui, D. (2023). Effectiveness of mobility and urban sustainability measures in improving citizen health: A scoping review. *International Journal of Environmental Research and Public Health*, 20(3), 2649. Available at: https://www.mdpi.com/1660-4601/20/3/2649
- ✓ Fortmann, L. (2010). The Social Dimensions of Climate Change. Equity and Vulnerability in a Warming World. By R. Mearns, A. Norton and E. Cameron. Washington DC: The World Bank (2010), pp. 232. ISBN 978-0-8213-7887-8. *Experimental Agriculture*, 46(3), 422-422.
- ✓ Galland O. and Lemel Y., (2018), Sociologie des inégalités, Paris, Armand Colin
- ✓ Giombini, L. (2020). Heritage sites and the challenges of tomorrow. *Aesthetica Preprint*, (114), 59-78.
- ✓ Gómez-Acebo, I., Llorca, J., Rodríguez-Cundín, P., & Dierssen-Sotos, T. (2012). Extreme temperatures and mortality in the North of Spain. *International journal of public health*, *57*, 305-313.
- ✓ Haider, K., Khanna, M., Kotei, M., Kushnir, K., Singh, S., & Sridhar, T. (2019). Micro, Small, and Medium Enterprises-Economic Indicators (MSME-EI) Analysis Note. World Bank Group. Available at: https://documents1.worldbank.org/curated/en/873301627470308867/pdf/Micro-Small-and-Medium-Enterprises-Economic-Indicators-MSME-EI-Analysis-Note.pdf
- ✓ Hajjar, R., Engbring, G., & Kornhauser, K. (2021). The impacts of REDD+ on the social-ecological resilience of community forests. *Environmental Research Letters*, *16*(2), 024001.
- ✓ Hankivsky, O., Grace, D., Hunting, G., Giesbrecht, M., Fridkin, A., Rudrum, S., ... & Clark, N. (2014). An intersectionality-based policy analysis framework: critical reflections on a methodology for advancing equity. *International journal for equity in health*, 13, 1-16.
- ✓ Heffron, R. J., & McCauley, D. (2022). The 'just transition' threat to our Energy and Climate 2030 targets. *Energy Policy*, 165, 112949.
- ✓ Heffron, R.J. (2020). The role of justice in developing critical minerals. *The Extractive Industries and Society*, 7 (3) (2020) 855–863.
- ✓ Henry, M. S., Bazilian, M. D., & Markuson, C. (2020). Just transitions: Histories and futures in a post-COVID world. *Energy Research & Social Science*, 68, 101668.
- ✓ Heyen, D. A. (2023). Social justice in the context of climate policy: systematizing the variety of inequality dimensions, social impacts, and justice principles. *Climate Policy*, 23(5), 539-554.
- ✓ Huynh, C. M., & Hoang, H. H. (2024). Climate change and income inequality in Asia: how does institutional quality matter?. *Journal of the Asia Pacific Economy*, 1-25.
- ✓ ILO (2019). Gender, equality and inclusion for a just transition in climate action. Available at: https://www.ilo.org/publications/gender-equality-and-inclusion-just-transition-climate-action#:~:text=Climate%20change%20has%20far%2Dreaching,and%20inclusion%2C%20and%20decent%20work
- ✓ ILO (2022). Indigenous Peoples and a Just Transition for All. Just Transition Policy Brief. Available at: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@ed_emp/@emp_ent/documents/publication/wcms_860607.pdf
- ✓ INNOVEAS (2023). Deliverable 2.2 Assessment of non-technical barriers. Available at: https://innoveas.eu/wp-content/uploads/2020/04/INNOVEAS_WP2_State-of-the-art-needs-and-barriers-assessmentD2.2-Assessment-of-non-technical-barriers.pdf
- ✓ IPCC (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. Available at: https://ndma.gov.in/sites/default/files/PDF/Technical%20Documents/NDMA-Module-3.pdf
- ✓ IPCC (2023). ARS6 Synthesis report. Climate change 2023. IPCC website. Available at: https://www.ipcc.ch/report/sixth-assessment-report-cycle/
- ✓ Issoufou-Ahmed, O., & Sebri, M. (2024). On the transmission channels driving climate change-income inequality nexus in sub-Saharan African countries. *Business Strategy & Development*, 7(1), e339.

- ✓ Johansson, M.T., Thollander, P. (2018). A review of barriers to and driving forces for improved energy efficiency in Swedish industry–recommendations for successful in-house energy management. *Renewable and Sustainable Energy Reviews*, 82, 618–628.
- ✓ Jordan, J. C., Abhilashi, R., & Shaheen, A. (2021). Gender-sensitive social protection in the face of climate risk. *A study in Uttar Pradesh, Rajasthan, and Madhya Pradesh*, India.
- ✓ Kacapyr, S. (2023). Lifestyle impacts green benefits of remote work. Cornell Chronicle website. Available at: https://news.cornell.edu/stories/2023/09/lifestyle-impacts-green-benefits-remote-work.
- ✓ Kerremans A, Denis A (2025). D4.3 ACCTING Overall report Open Studios second cycle. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal).
- ✓ Khan A. (2021). Climate Change Adaptation & Mitigation: Vulnerability and Health. Global Health Equity website. Available at: https://ghe.uwo.ca/blog/posts/climate_change_adaptation_mitigation_vulnerability_health.html
- ✓ Lamont, J. (Ed.). (2017). *Distributive justice*. Routledge.
- ✓ Lefebvre, Henri (1969). *Logique formelle et logique dialectique*. Paris: Anthropos
- ✓ Legambiente (2021). Nasce la Rete delle Comunità Energetiche Rinnovabili e Solidali. Available at: https://www.legambiente.it/comunicati-stampa/nasce-la-rete-delle-comunita-energetiche-rinnovabili-e-solidali/
- ✓ Lenton, T. M., Xu, C., Abrams, J. F., Ghadiali, A., Loriani, S., Sakschewski, B., ... & Scheffer, M. (2023). Quantifying the human cost of global warming. *Nature Sustainability*, 6(10), 1237-1247.
- ✓ Levy, B. S., & Patz, J. A. (2015). Climate change, human rights, and social justice. *Annals of global health*, 81(3), 310-322.
- ✓ Liao, W., Fan, Y., & Wang, C. (2023). Exploring the equity in allocating carbon offsetting responsibility for international aviation. *Transportation Research Part D: Transport and Environment*, *114*, 103566.
- ✓ Lipari, F., Lázaro-Touza, L., Escribano, G., Sánchez, Á., & Antonioni, A. (2024). When the design of climate policy meets public acceptance: an adaptive multiplex network model. *Ecological Economics*, 217, 108084. Available at: https://www.sciencedirect.com/science/article/pii/S0921800923003476
- ✓ Lomborg, B. (2020). Welfare in the 21st century: Increasing development, reducing inequality, the impact of climate change, and the cost of climate policies. *Technological Forecasting and Social Change*, 156, 119981.
- ✓ Luis Flores Ballesteros. What determines a disaster? *54 Pesos* May. 2008:54 Pesos 11 Sep 2008. Available at: http://54pesos.org/2008/09/11/what-determines-a-disaster/
- ✓ Lynham, J., Noy, I., & Page, J. (2017). The 1960 tsunami in Hawaii: long-term consequences of a coastal disaster. *World Development*, 94, 106-118.
- ✓ Ma, B., Zhang, Y., Hou, Y., & Wen, Y. (2020). Do protected areas matter? A systematic review of the social and ecological impacts of the establishment of protected areas. *International journal of environmental research and public health*, 17(19), 7259.
- ✓ MacGregor, S., Arora-Jonsson, S., & Cohen, M. (2022). Caring in a changing climate: Centering care work in climate action. Oxfam.
- ✓ Martin Felix Gajdusek et al. (2025). Experimental Studies, Second Research Cycle: Research Line 2 Report. Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project
- ✓ Mastropietro E. (2001). Rapid appraisal method of social exclusion and poverty (RAMSEP project): Handbook. Roma.
- ✓ Mezzana D., Quinti G. (2024). Voices from the field. Volta Flood and Drought Management Program. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/02/Voices-from-the-field_VFDM-26-06-2024.pdf.
- ✓ Mideksa, T. K. (2010). Economic and distributional impacts of climate change: The case of Ethiopia. *Global Environmental Change*, 20(2), 278-286.
- ✓ Miranda Montero, J. J., Wright, E. M., & Khan, M. N. (2020). Illegal logging, fishing, and wildlife trade: The costs and how to combat it.
- ✓ Moser, C. O., & Satterthwaite, D. (2008). *Towards pro-poor adaptation to climate change in the urban centres of low-and middle-income countries* (Vol. 3). IIeD.

- ✓ Munro, A., Kovats, R. S., Rubin, G. J., Waite, T. D., Bone, A., Armstrong, B., ... & Oliver, I. (2017). Effect of evacuation and displacement on the association between flooding and mental health outcomes: a cross-sectional analysis of UK survey data. *The lancet planetary health*, *1*(4), e134-e141.
- ✓ Norgaard, K., & York, R. (2005). Gender equality and state environmentalism. *Gender & Society*, 19(4), 506-522.
- ✓ Nulkar, G. (2014). SMEs and environmental performance–A framework for green business strategies. *Procedia-Social and Behavioral Sciences*, 133, 130-140.
- ✓ Odersky, M., & Löffler, M. (2024). Differential exposure to climate change? Evidence from the 2021 floods in Germany. *The Journal of Economic Inequality*, 22(3), 551-576.
- ✓ OECD (2016), Debate the Issues: New Approaches to Economic Challenges, OECD Insights, OECD Publishing, Paris. Available at: http://dx.doi.org/10.1787/9789264264687-en
- ✓ OECD-UNDP (2024). Investing for gender equality and inclusive climate action; UNDP-OECD cross regional dialogue in Istanbul, Türkiye. Available at: https://www.undp.org/sites/g/files/zskgke326/files/2024-11/outcomes_document-investing_for_gender_equality_and_inclusive_climate_action.pdf
- ✓ Ogunbode, C. A. (2022). Climate justice is social justice in the Global South. *Nature Human Behaviour*, 6(11), 1443-1443.
- ✓ Olhoff, A., & Christensen, J. M. (Eds.) (2020). Emissions Gap Report 2020. UNEP DTU Partnership. Available at: https://www.unep.org/emissions-gap-report-2020.
- ✓ Osterwalder, K., Yea Cha, J., Pickles, J., Batchelor, C., & Stowe, C. (2021). Towards disability transformative Early Warning Systems: Barriers, challenges, and opportunities. Available at: https://zcralliance.org/resources/item/towards-disability-transformative-early-warning-systems-barriers-challenges-and-opportunities/
- ✓ Palm, J. (2009). Placing barriers to industrial energy efficiency in a social context: a discussion of lifestyle categorisation. *Energy Efficiency*, 2(3), 263–270.
- ✓ Pandey, M. D., & Nathwani, J. S. (1996). Measurement of socio-economic inequality using the Life-Quality Index. *Social Indicators Research*, 39, 187-202.
- ✓ Pasricha, N., Baur-Yazbeck, S. (2020). How Financial Services Can Help the Poor in the Climate Transition - CGAP. Available at: https://www.cgap.org/blog/how-financial-services-can-help-poor-in-climate-transition#:~:text=Innovations%20in%20PAYGO%20technologies%20and,households%20both%20time%20and%20money.
- ✓ Pianta, M., & Lucchese, M. (2020). Rethinking the European Green Deal: An industrial policy for a just transition in Europe. *Review of Radical Political Economics*, 52(4), 633-641.
- ✓ Piketty T., (2013), *Le Capital au XXIème siècle*, Paris. Le seuil.
- ✓ Provenza, G. (2023). L'emarginazione sociale e digitale. Come le tecnologie digitali e Internet possono essere allo stesso tempo una minaccia e una risorsa per l'inclusione sociale dei giovani. Mondo internazionale website. Available at: https://mondointernazionale.org/focus-allegati/lemarginazione-sociale-e-digitale .
- ✓ PWP-Plant with purpose (2018). The brutal connection between poverty and deforestation. Available at: https://plantwithpurpose.org/stories/poverty-deforestation/
- ✓ Quinti G. (eds.) (2024). RL3 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I.
- ✓ Quinti G. (eds.) (2024). RL4 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I
- ✓ Quinti, G., & Guaschino, E. (2016). Public Perception of Flood Risk and Social Impact Assessment. Available at: https://www.floodmanagement.info/publications/tools/Tool_25_Public_Perception_of_Flood_Risk_and_Social_Impact_Assessment.pdf
- ✓ Quinti, G., Cacace, M. (eds.) (2024). RL1 Italian Country Report for the D3.3 ACCTING Report on second cycle experimental studies. Report under preparation. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project implemented (also) by K&I.

- ✓ Quiroga, S., & Suárez, C. (2016). Climate change and drought effects on rural income distribution in the Mediterranean: a case study for Spain. *Natural Hazards and Earth System Sciences*, 16(6), 1369-1385.
- ✓ Reaños, M. A. T. (2021). Floods, flood policies and changes in welfare and inequality: Evidence from Germany. *Ecological Economics*, 180, 106879.
- ✓ Rege, J. E. O., Marshall, K., Notenbaert, A., Ojango, J. M., & Okeyo, A. M. (2011). Pro-poor animal improvement and breeding—What can science do?. *Livestock science*, 136(1), 15-28.
- ✓ Reid, H., Swiderska, K., King-Okumu, C., & Archer, D. (2015). Vulnerable communities: Getting their needs and knowledge into climate policy. Available at: https://www.iied.org/sites/default/files/pdfs/migrate/17328IIED.pdf
- ✓ ReliefWeb (2018). Facilitating inclusion in disaster preparedness: A practical guide for CBOs. Available at : https://reliefweb.int/report/world/facilitating-inclusion-disaster-preparedness-practical-guide-cbos
- ✓ Rey, F., Dupire, S., & Berger, F. (2024). Forest-based solutions for reconciling natural hazard reduction with biodiversity benefits. *Nature-Based Solutions*, 5, 100114.
- ✓ Rizzoli, V., Norton, L. S., & Sarrica, M. (2021). Mapping the meanings of decarbonisation: a systematic review of studies in the social sciences using lexicometric analysis. *Cleaner Environmental Systems*, 3, 100065.
- ✓ Rodríguez, A. I., Grígolo, M. A., Tejada, F. E., Albarracín, A., Martinez, M. P., Sales, R. G., & Naranjo, R. (2025). Strategies for teaching natural hazards to children in rural communities. *International Journal of Disaster Risk Reduction*, 116, 105033.
- ✓ Rogulj, I. (2024). Discussion paper: What determinants of microenterprises influence their energy vulnerability? IEECP. Available at: https://ieecp.org/wp-content/uploads/2024/06/Discussion-paper-on-microenterprises_Rogulj.pdf
- ✓ Roşca, Dorina. « Le capital social : clé d'analyse des inégalités dans une économie de pénurie ». Le Grand Tournant de la société moldave, Presses de l'Inalco, 2019, https://doi.org/10.4000/books.pressesinalco.19818.
- ✓ Ryghaug, M., Subotički, I., Smeds, E., Von Wirth, T., Scherrer, A., Foulds, C., ... & Wentland, A. (2023). A Social Sciences and Humanities research agenda for transport and mobility in Europe: key themes and 100 research questions. *Transport reviews*, 43(4), 755-779.
- ✓ Sabitha, C. K. (2020). Gender sensitivity. Available at: https://www.slideshare.net/slideshow/gender-sensitivity-230281164/230281164
- ✓ Sakai, Y., Estudillo, J. P., Fuwa, N., Higuchi, Y., & Sawada, Y. (2017). Do natural disasters affect the poor disproportionately? Price change and welfare impact in the aftermath of Typhoon Milenyo in the rural Philippines. *World Development*, 94, 16-26.
- ✓ Sarkki, S., Ludvig, A., Nijnik, M., & Kopiy, S. (2022). Embracing policy paradoxes: EU's Just Transition Fund and the aim "to leave no one behind". *International Environmental Agreements: Politics, Law and Economics*, *22*(4), 761-792.
- ✓ Satterthwaite D. (2017). Addressing the needs of vulnerable groups in urban areas. UNDRR website. Available at: https://www.preventionweb.net/blog/addressing-needs-vulnerable-groups-urban-areas
- ✓ Schor, J. B., & Thompson, C. J. (2014). *Sustainable Lifestyles and the Quest for Plenitude. Case Studies of the New Economy*. New Haven: Yale University Press
- ✓ Sedova, B., Kalkuhl, M., & Mendelsohn, R. (2020). Distributional impacts of weather and climate in rural India. *Economics of Disasters and Climate Change*, 4, 5-44.
- ✓ Sekar, K., Jayakumar, C., Patrick, J. (2023). Psychosocial Preparedness. National Disaster Management Training Module (number 3). Available at: https://ndma.gov.in/sites/default/files/PDF/Technical%20Documents/NDMA-Module-3.pdf.
- ✓ SFPAP (2024). The unintended consequences of decarbonisation technologies for fuel poverty outcomes: a systematic review of issues and mitigations. Available at: https://fuelpovertypanel.scot/wp-content/uploads/2024/04/Commissioned-Research-Final-with-Cover-Page.pdf
- ✓ Smith, K. (2023). The unequal impacts of flooding. Headwaters Economics website. Available at: https://headwaterseconomics.org/natural-hazards/unequal-impacts-of-flooding/
- ✓ Sorrell, S., Mallett, A., & Nye, S. (2011). Barriers to industrial energy efficiency: A literature review. UNIDO. Available at: www.sciencedirect.com/science/article/abs/pii/S0928765516302846.

- ✓ Spijker, E., Anger-Kraavi, A., Pollitt, H., & van de Ven, D. J. (2020). Evaluating integrated impacts of low-emission transitions in the livestock sector. *Environmental Innovation and Societal Transitions*, 35, 482-492.
- ✓ Stevis, D., & Felli, R. (2020). Planetary just transition? How inclusive and how just. *Earth System Governance*, *6*(100065).
- ✓ Stevis, D., & Felli, S. (2016). Green transitions, just transitions? *Kurswechsel*, 3, 35–45
- ✓ Stockholm Environment Institute (2023). Commitment to impact. Annual report 2023 Available at: https://www.sei.org/wp-content/uploads/2024/04/seip10720-annual-report-240426b-web.pdf.
- ✓ Strizzolo, N. (2021). Il lavoro a distanza può essere inclusivo? Pro e contro. Agendadigitale website. Available at: https://www.agendadigitale.eu/cultura-digitale/il-lavoro-a-distanza-puo-essere-inclusivo-pro-e-contro/ .
- ✓ Sufri, S., Dwirahmadi, F., Phung, D., & Rutherford, S. (2020). A systematic review of community engagement (CE) in disaster early warning systems (EWSs). *Progress in Disaster Science*, 5, 100058.
- ✓ Sultana, R., Irfanullah, H. M., Selim, S. A., & Budrudzaman, M. (2023). Vulnerability and ecosystem-based adaptation in the farming communities of droughtprone Northwest Bangladesh. *Environmental Challenges*, 11, 100707.
- ✓ Tate, C., Wang, R., Akaraci, S., Burns, C., Garcia, L., Clarke, M., & Hunter, R. (2024). The contribution of urban green and blue spaces to the United Nation's sustainable development goals: an evidence gap map. *Cities*, 145, 104706.
- ✓ The UNESCO Courier (2019). Climate and social justice. Available at: https://courier.unesco.org/en/articles/climate-and-social-justice.
- ✓ Thiede, B. C. (2014). Rainfall shocks and within-community wealth inequality: Evidence from rural Ethiopia. *World Development*, 64, 181-193.
- ✓ Timperley, J. (2021). "The broken $100-billion promise of climate finance — and how to fix t". *Nature*. 598 (7881): 400–402.
- ✓ Tran, T. A., Tran, P., Tuan, T. H., & Hawley, K. (2012). Review of housing vulnerability: Implications for climate resilient houses. *The Sheltering Series No. 1: Sheltering From a Gathering Storm*. Available at: https://cdkn.org/sites/default/files/files/Sheltering-from-a-gathering-storm-Discussion-Paper-Series-Review-of-Housing-Vulnerability.pdf
- ✓ Turner, H. A., & Turner, R. J. (1999). Gender, social status, and emotional reliance. *Journal of health and social behavior*, 360-373. DOI: 10.2307/2676331.
- ✓ UN (2020). UN75 and beyond. Available at: https://www.un.org/en/un75/inequality-bridging-divide#:~:text=Inequalities%20are%20not%20only%20driven%20and%20measured%20by,which%20continue%20to%20persist%2C%20within%20and%20between%20countries.
- ✓ UN (2022). Early Warnings for All. Availablre at: https://www.un.org/en/climatechange/early-warnings-for-all
- ✓ UN (n.d.). Why women are key to climate action. UN website. Available at: https://www.un.org/en/climatechange/science/climate-issues/women#:~:text=Particularly%20in%20rural%20areas%2C%20women,its%20impacts%20on%20the%20ground.
- ✓ UN Women Training Centre eLearning Campus (n.d.-b). Gender equality glossary. UN Women website. Available at: https://trainingcentre.unwomen.org/mod/glossary/view.php?id=36&mode=letter&hook=G&sortkey=&sortorder=asc
- ✓ UN Women. (2023). Feminist climate justice: Policy brief. Available at: https://www.unwomen.org/en/digital-library/publications/2023/07/feminist-climate-justice
- ✓ UNDESA (2020). World Social Report 2020. Available at: https://social.desa.un.org/development/desa/dspd/world-social-report/2020-2.html
- ✓ UNDESA (2024). Leveraging the Power and Resilience of Micro-, Small and Medium-sized Enterprises (MSMEs) to Accelerate Sustainable Development and Eradicate Poverty in Times of Multiple Crises. Available at: https://www.un.org/en/observances/micro-small-medium-businesses-day
- ✓ UNDP (2022). What is just transition? And why is it important? Available at: https://climatepromise.undp.org/news-and-stories/what-just-transition-and-why-it-important

- ✓ UNDRR (2024). Early Warnings for All. Available at: https://www.undrr.org/implementing-sendai-framework/sendai-framework-action/early-warnings-for-all
- ✓ UNFCCC (2023). Advancing Gender-Responsive Climate Action: Policy Brief Reveals Progress and Challenges. Available at: https://unfccc.int/news/advancing-gender-responsive-climate-action-policy-brief-reveals-progress-and-challenges.
- ✓ UNFCCC (2023). Progress, good practices and lessons learned in prioritizing and incorporating gender-responsive adaptation action. Available at: https://unfccc.int/sites/default/files/resource/202310_adaptation_gender.pdf
- ✓ UNICEFF (2022). What is Climate Justice? And what can we do achieve it? Available at: https://www.unicef.org/innocenti/stories/what-climate-justice-and-what-can-we-do-achieve-it
- ✓ Ventura, L. (2021). World Wealth Distribution and Income Inequality 2021. *Global Finance Magazine*, January, 11.
- ✓ VFDM (2022). Manual on Community-based Floods and Drought Management in the Volta Basin. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2022/10/Manual-CBFDM-VB_FinalVersion.pdf
- ✓ Wang, X., & Lo, K. (2021). Just transition: A conceptual review. *Energy Research & Social Science*, 82, 102291.
- ✓ Wani, G. F., Ahmed, R., Ahmad, S. T., Singh, A., Walia, A., Ahmed, P., ... & Mir, R. A. (2022). Local perspectives and motivations of people living in flood-prone areas of Srinagar city, India. *International Journal of Disaster Risk Reduction*, 82, 103354.
- ✓ WeAdapt (2024). The unjust climate: Measuring impacts of climate change on rural poor, women and youth. UNDRR website. Available at: https://www.preventionweb.net/news/unjust-climate-measuring-impacts-climate-change-rural-poor-women-and-youth#:~:text=Gender%20disparities%20in%20climate%20vulnerability,to%20services%20in%20rural%20areas.
- ✓ WMO (2024). Mainstreaming Gender into End-to-End Flood Forecasting and Early Warning Systems and Integrated Flood Management. Associated Program on Flood Management. Available at: https://www.floodmanagement.info/floodmanagement/wp-content/uploads/2025/01/GenderManual-VB.pdf
- ✓ Woodhouse, E., Bedelian, C., Dawson, N., & Barnes, P. (2018). Social impacts of protected areas: Exploring evidence of trade-offs and synergies. *In Ecosystem Services and Poverty Alleviation* (OPEN ACCESS) (pp. 222-240). Routledge.
- ✓ World Bank (2024). The World Bank, Social Dimensions of Climate Change. Available at: https://www.worldbank.org/en/topic/social-dimensions-of-climate-change
- ✓ Zorell, C., Strid, S. (eds.) (2023). D3.2 ACCTING Report on first cycle experimental studies. Confidential report delivered to the European Commission 28 April 2023. ACCTING (AdvanCing behavioural Change Through an INclusive Green deal) is a Horizon 2020 funded project

ANNEX – List of interviewed people

Case study area (CSA)	Interview identifier	Type of expert	Affiliation	Interviewer
3	CSA3_1	Public official	Municipality of Åbenrå	DTU
3	CSA3_2	Public official	Municipality of Sønderborg	DTU
3	CSA3_3	Academic	University of Southern Denmark	BOKU
3	CSA3_4	NGO / CSO	Concito	BOKU
3	CSA3_5	NGO / CSO	CIP Foundation	BOKU
4	CSA4_1	Public official	Trentino Province Authority	K&I
4	CSA4_2	Public official	South Tyrol Province Authority	K&I
4	CSA4_3	Public official	Executive Civil Protection	K&I
4	CSA4_4	NGO / CSO	"Croci Bianche" (Structured volunteers organisation)	K&I
4	CSA4_5	NGO / CSO	Coordination of environmentalists NGOs	K&I

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Meteo Romania	UEA University of East Anglia	WORLD METEOROLOGICAL ORGANIZATION
Università degli Studi di Padova TESAF	UCL	K&I Conoscenza e Innovazione
Helmholtz-Zentrum hereon	LGI sustainable innovation	eDF
BOKU	DTU	WEMC World Energy & Meteorology Council
UKRI UK Research and Innovation	University of Bucharest	CZU